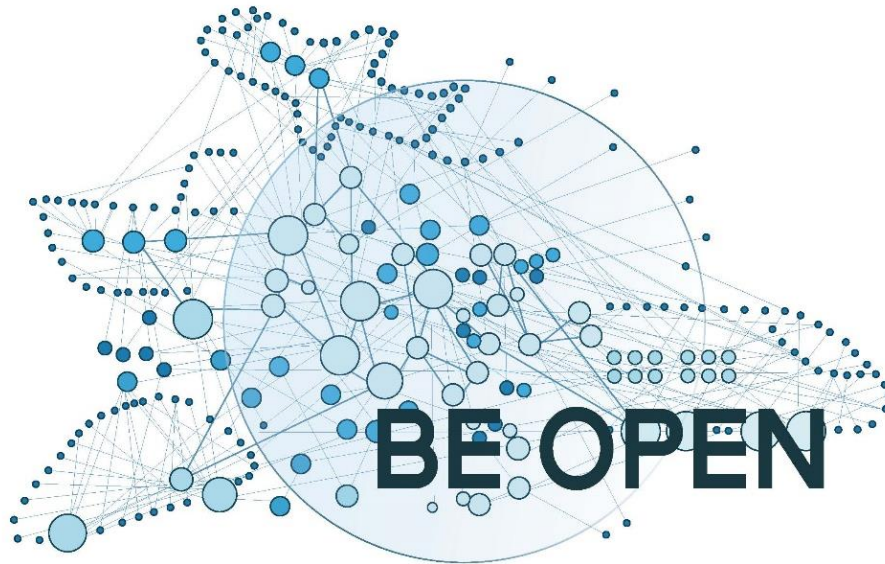




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European forum and oBsEratory for OPEN science in transport

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European Code of Conduct on Open Science in Transport

Final

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Abbreviations and Terminology

ALLEA	European Federation of Academies of Sciences and Humanities
CJEU	Court of Justice of the European Union
EDPB	European Data Protection Board
EEA	European Economic Area
EOSC	European Open Science Cloud
ESF	European Science Foundation
EU	European Union
EU CFR	EU Charter of Fundamental Rights
EWCOSET	Expert Working Committee on Open Science and Ethics in Transport
FAIR	Findable, Accessible, Interoperable, Reusable
ICSU	International Council for Science
IPR	Intellectual Property Rights
ISO	International Standards Organisation
SC	BE OPEN Steering Committee
UNESCO	United Nations Educational, Scientific and Cultural Organization
UN SDGs	United Nations Sustainable Development Goals
WP	BE OPEN Work Package

Executive Summary

The overarching vision of the BE OPEN project is creating a common understanding about the practical impact of Open Science, as well as identifying and putting in place the mechanisms to make it a reality in transport research. An essential element of reaching this vision through the BE OPEN project is developing a policy framework to establish and promote the ground-rules that will enable all stakeholders, existing tools and platforms, as well as resources and content to become an integral part of the Open Science in the transport research domain. The objective of such a policy framework is achieved as a code of conduct through this deliverable, serving as basis to establish the “European Code of Conduct on Open Science in Transport” as a living document.

Based on the experience gained in previous BE OPEN deliverables, the practical experience of the involved BE OPEN beneficiaries as well as the active support by the BE OPEN Advisory Board, this deliverable contains the initial version of the code of conduct, which shall be subject to ongoing adaption and change as a living document.

With the main body of the deliverable and the initial version of the “European Code of Conduct on Open Science in Transport” in ANNEX 1, this BE OPEN deliverable D 4.4 consists of two basic elements creating the fundamental conditions for a living document. As such, only the material code of conduct in ANNEX 1 shall represent the living document, which in turn shall be subject to ongoing amendments based on changing EU or EU Member State laws, evolving technology or further development of ethical aspects along with associated effects on the fundamental research principles. Moreover, the main body of the deliverable serves to provide further insight on the process of developing the initial version of the “European Code of Conduct on Open Science in Transport”. This is mainly achieved by emphasising on the methodology, the definition of envisioned stakeholders and background information on the material aspects of the code of conduct consisting of fundamental research principles, ethical principles and legal compliance principles.

In detail, the introduction first lists the purposes of the deliverable (Section 1.1) and then follows up with an in depth analysis of the three-phased methodology-approach (Section 1.3) consisting of defining the objectives, gathering data through surveys as well as interviews and validating the outcomes to draw conclusions. This is followed by a description of the procedure and material elements of the code of conduct as core element of the main body of the deliverable D 4.4. In particular, this consists of an analysis of the stakeholders and viable ways for reaching them (Section 2.1), the aims and envisioned procedures to accomplish the code of conduct as a living document (Section 2.2) and the scope, content and further background information on material aspects of the code of conduct (Section 2.3). The aforementioned material aspects on fundamental research principles (Section 2.3.1), ethical principles (Section 2.3.2) and legal compliance principles (Section 2.3.3) cover existing frameworks for fundamental research principles, applying them to the specifics of Open Science in transport, take into account sector-specific business models with their potential ethical effects and elaborate on the essential legal aspects of intellectual property rights, data protection, e-privacy and security.

Essentially, this accompanying information is aimed to serve as repository for the interpretation of the material code of conduct Articles as well as a foundation for further amendments to the material code of conduct as living document.

1 Introduction

1.1 Purpose of the Document

The BE OPEN project is a coordination and support action funded by the European Commission (“EU Commission”) in the Horizon 2020 research and innovation programme under the grant agreement No 824323. BE OPEN aims at promoting Open Science in transport research and assist in regulating Open Science aspects and standardising them. The overarching vision of BE OPEN is to create a common understanding on the practical impact of Open Science and to identify and put in place the mechanisms to make it a reality in transport research. The main objectives of the BE OPEN project are:

- To develop a framework in order to establish a common understanding of operationalising Open Science in Transport.
- To map existing Open Science resources and see how transport research fits in.
- To facilitate an evidence-based dialogue to promote and establish Open Science in Transport.
- To provide the policy framework and guidance for Open Science implementation in transport.
- To engage a broad range of stakeholders in a participatory process for Open Science uptake.

The main purpose of the present deliverable D 4.4 is the development of a code of conduct on Open Science in transport, which essentially summarises the results of the previous BE OPEN tasks. This Code of Conduct is aimed at engaging transport stakeholders and especially researchers with the fundamental principles of research integrity, as well as ethical and legal compliance aspects. In order to comply with the rapidly changing environment of Open Science in transport, the code of conduct on Open Science in transport will be a living document. It will be edited and updated as needed to support an EU transport research integrity community, making science more efficient, better reproducible and more responsive to societal and economic expectations. The main areas of concern and responsibilities of researchers and further stakeholders will be defined and regulated. It also aims to put in place the necessary procedures to prevent, avoid and handle misbehaviours and unacceptable actions, also against the background of legal and ethical aspects. In addition, this code of conduct will promote awareness of the importance of transport research integrity focusing on representatives of both private and public sectors.

Essentially, the code of conduct is a regulatory and policy framework to provide the legal and ethical guidance needed to operationalise Open Science principles at regional, European and international level. This will follow the agreed ambition of stakeholders for a flexible and integral approach of building Open Science platforms for transferring knowledge and experiences. In this context, the TOPOS Observatory and Forum¹ aspires to be considered in the additional common European data spaces presenting the “Common European data space for transport research” building upon the ongoing experience with the EOSC. The TOPOS Observatory and Forum was developed within the BE OPEN implementation to display the progress of Open Science uptake in transport research and to exchange ideas for operationalising Open Science principles in transport research. Against this background, the code of conduct will provide a policy framework to establish and promote the ground rules that will allow all stakeholders, existing tools and platforms, as well as resources and content to

¹ <https://www.topos-observatory.eu/>

become an integral part of the Open Science in the transport research domain. Overall, it will allow setting up a community of transport research organisations which will work on the basis of a commonly agreed roadmap making transport science more effective to current and future needs by developing proper guidelines within the project (and beyond the project period) providing long-term benefit to the relevant stakeholders (industry and research communities, and society).

1.2 Open Science in Europe and Open and FAIR Data

Open Science is the new standard of practices, means and collaboration for producing and distributing scientific output and research results, with a direct scientific, economic and societal impact.² Moreover, Open Science is a multidimensional: it combines characteristics and principles pertaining to opening access to research outputs (publications, data, software, etc.) and steps belonging to the research conduct (workflows, methodologies, etc.) as well as standardised practices for equally human and technical exploitation of data throughout Research Data Management lifecycles and the creation of FAIR digital objects.

Notably, Open Science is included in the European agenda for Responsible Research and Innovation, which has been driving research activities across scientific disciplines and business sectors in H2020. It aims at promoting interdisciplinary research that builds on trusted, interconnected and sustainable frameworks and solutions for a better economy and the society at large (strong focus on the elimination of inequalities, preparedness over natural disasters etc.).³ In the recent years, major efforts have been made towards implementing Open Science in the European Research Area, namely those directly or indirectly surrounding the development of the EOSC. Due to EOSC actions, all key research and academic stakeholders are engaged in collaborations, building a two-way communication to combat fragmentation and form best practices and policies that govern systems in a global commons approach. In that effort, infrastructures and services for research (research infrastructures and electronic infrastructures), and the communities they serve, are tasked with ensuring that all European researchers have the necessary means and skills to excel in Open Science as expressed in different scientific domains. Hence, two of the most important areas that are explored for certain procedures to be standardised are the ethical and legal issues in practicing Open Science and FAIR data. BE OPEN aims to foster those elements for transport research by assuming the role of an Open Science cluster in transport research and innovation.

Open data exploitation and its commercialisation in the transport sector have been trending in recent years. Among other things, there has been growing interest around smart cities initiatives.⁴ However, a common framework in support of Open Science research conduct is still missing in these initiatives. Their primary connection with Open Data is important, but is only one part of the Open Science equation. There are differences and commonalities between Open Access to data and FAIRness of data: Open Access mainly concerns legal issues for sharing data (e.g. IPR) while FAIR poses extra

² Athanasiou, Spiros; Amiridis, Vasilis; Gavriilidou, Maria et. Al, National Plan for Open Science (2021), <https://zenodo.org/record/4656150#.YImQiu3iuUJ>, last accessed 12 May 2021.

³ Network of National Contact Points for Science with and for Society in Horizon 2020, www.sisnetwork.eu, last accessed 12 May 2021.

⁴ See https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart-cities_en, Example: <https://suits-project.eu/>, last accessed 12 May 2021.

technical specifications for data exploitation.⁵ It is therefore evident that work needs to be performed on both streams, for transport data to be responsibly managed and shared openly throughout different steps of the research process (especially data privacy, IPR and security aspects) and for their interconnection through standardisation of processes.⁶

The living document of the “European Code of Conduct on Open Science in Transport” developed in this deliverable serves as basis for a regulatory and policy framework that takes into account the changing landscape around Open Science in Europe and Open and FAIR Data.

1.3 Methodology

The methodology used to create the initial living document of the “European Code of Conduct on Open Science in Transport” has been developed with the consultation of BE OPEN WP4 task force. It is based on a conceptual framework, which includes three main phases as depicted in Figure 1 below.



Figure 1 Conceptual Framework

The first phase defines the main objectives of a transport research cloud and summarises the data required for developing a living document of the “European Code of Conduct on Open Science in Transport” based on the results of the BE OPEN project. In the second phase, a questionnaire was prepared in which respondents gave their views on the legal and fundamental principles of Open Science, elaborating on how relevant they are e.g. in order to achieve objectives of a transport research cloud such as TOPOS. Then, the derived outcomes and conclusions are presented, describing how relevant transport research organisations perceived the legal and fundamental principles as well as the priorities of Open Science in order to achieve objectives of a transport research cloud such as TOPOS.

1.3.1 Phase I - Research: define Objectives & collect Data

In the first phase, the main objectives of the TOPOS tool of the BE OPEN project are presented, setting the basis for the intervention of a transport research cloud supporting Open Science in transport research. Essentially the aims are:

- to create a solid knowledge base on the implementation of Open Science approaches in transport research, and in particular on current constraints and bottlenecks in this field;
- to showcase the status and progress of Open Science uptake in transport research;

⁵ See <https://eoscipilot.eu/sites/default/files/eoscipilot-d3.2.pdf>, last accessed 12 May 2021.

⁶ See BE OPEN Deliverable D 3.2 for a thorough analysis of FAIR data in transport research focussing on standardisation of processes.

- to promote territorial and cross border cooperation and contribute to the optimisation of Open Science in transport research;
- to exchange ideas and share best practices for operationalising Open Science principles in transport research;
- to capture and present the common culture and practices of data stewardship in transport research.

In addition, a detailed study and analysis has been undertaken into the outcomes of the previous work conducted within the BE OPEN project in order to collect the necessary data for developing the living document of the “European Code of Conduct on Open Science in Transport” which can be found in ANNEX 1. These data include:

- The identified challenges/framework topics in transport research and Open Science initiatives that provide opportunities within these topics (BE OPEN deliverable D 1.2⁷) and more specifically, the seven topics for the common understanding of Open Science in transport research.
- Challenges and priorities related to data in transport research (BE OPEN deliverable D 2.3⁸) as BE OPEN aspires to be considered in the additional common European data spaces presenting the “Common European data space for transport research” building upon the ongoing experience with the EOSC.
- Main challenges and opportunities, constraints and bottlenecks of Open Science in transport research (BE OPEN deliverable D 5.1⁹) from a strategic point of view analysing current national and institutional initiatives within Europe.
- Legal issues, fundamental principles and ethical concerns on Open Science in transport research (BE OPEN deliverable D 4.1¹⁰) studying both technical information and relevant analytics as well as personal data and information.

1.3.2 Phase II - Survey: Interviews/Questionnaires with Stakeholders

In the second phase, a questionnaire was developed to enable consultation from the transport research community within and outside of the BE OPEN project. Associations of transport research infrastructures, universities active in the of transport research sector, transport researchers, public service providers for transport research, associations of transport industry and transport research scientists were all invited to take part in this collective effort across various countries.

The questionnaire consists of four general questions and was designed to capture some of the main dimensions of the background of the respondents. The questions were organised along three thematic sections.

- The first one looks into how relevant the Open Science principles are to achieving one or more of the TOPOS objectives.

⁷ BE OPEN deliverable D 1.2 “Framework of common understanding of Open Science in transport sector”.

⁸ BE OPEN deliverable D 2.3 “Transport Research in the European Open Science Cloud”.

⁹ BE OPEN deliverable D 5.1 “Main challenges and opportunities, constraints and bottlenecks of Open Science in transport research”.

¹⁰ BE OPEN deliverable D 4.1 “Open Science in transport research: legal issues and fundamental principles”.

- The second elaborates on how relevant Open Science priorities are to achieving one or more of the TOPOS objectives.
- The third block of questions covers the level (i.e., institutional, national, European) on which each priority is envisioned to be progressed.

The questionnaire enabled the respondents to provide grades on a “highly relevant” to “highly irrelevant” scale. In addition to these questions, an optional free-text space was provided to elaborate on the answer. This open free-text part is considered of great importance for a survey of this kind as it contributes to improving the interpretation of its overall results and provides additional valuable material. The questionnaire is available in ANNEX 2.

Procedurally, the questionnaire was disseminated to the eight transport research associations participating in BE OPEN project¹¹, to the Advisory Board of the BE OPEN project and to the partners of the OSCAR project. This target group was defined by the deliverable D 4.4 task force and SC members in order to provide adequate and qualitative input and information for the creation of the “European Code of Conduct on Open Science in Transport”.

The list of associations approached for this questionnaire is presented in Table 1 below:

Table 1 List of Respondents

Expertise	Total
Research center or university (e.g. university, institute, research infrastructure, etc.)	24
Private researcher or student	2
Working for a public service provider for transport research (e.g., policy makers, NGOs, community organizations)	1
Working for a private service provider for transport research (e.g., transport network entity, commercial transport and logistic industrial operator)	2

In addition to the information contained in the table above, this is illustrated in Figure 2 below:

¹¹ These are DLR, ECTRI, EURNEX, EATEO, FEHRL, HUMANIST, UITP, WEGEMT. For the sake of clarity, UITP is not a research association but rather an association that represents the public transport. As such, UITP includes researchers in their members but research is not part of their core activities.

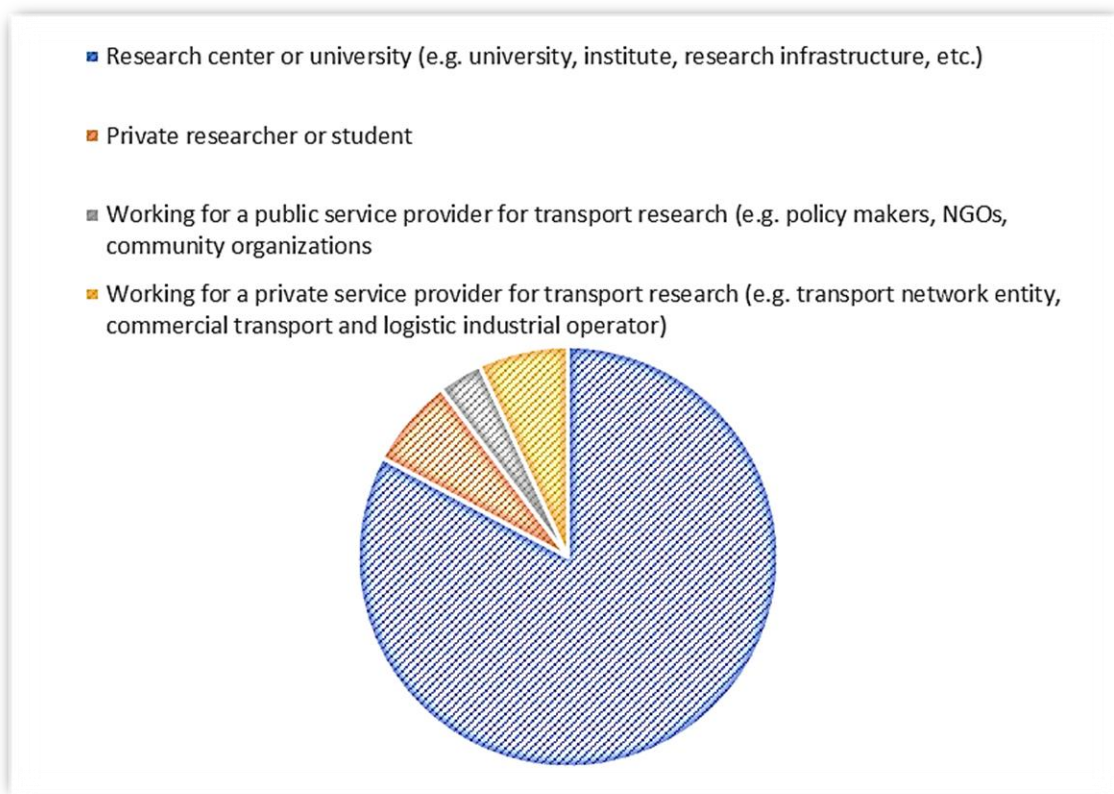


Figure 2 Breakdown of Responses by Expertise

1.3.1 Phase III - Validation: Outcomes and Conclusions

Within the third and last phase, the obtained results were presented in order to analyse how relevant the involved transport research sector-members have perceived the legal and fundamental principles as well as the priorities of Open Science to achieving one or more of the TOPOS objectives. In addition, the results present at which level each priority should be progressed to promote the TOPOS Observatory and Forum, according to relevant transport research stakeholders.

Turning towards the content, in the first question, the respondents were asked whether they agree with the legal and ethical principles that could be used to achieve one or more of the TOPOS objectives. The presented principles were based on the deliverable D 4.1 of the BE OPEN project and as shown in the below Figure 3, the majority of respondents to the questionnaire strongly agree to the (i) **“Lawfulness, Fairness and Transparency”** (69%), (ii) **“Trust, Integrity and Confidentiality”** (69%), (iii) **“Accuracy”** (65.5%), (iv) **“Reliability”** (62.1%) in ensuring the quality of research and (v) **“Honesty”** (62.1%) in developing, undertaking, reviewing, reporting and communicating research.

On the other hand, the respondents to the questionnaire strongly disagree to the concept of **“Data minimization and storage limitation”** (27.6%) and they are neutral with the **“Mandatory purpose limitation of processed data”** (62.1%).

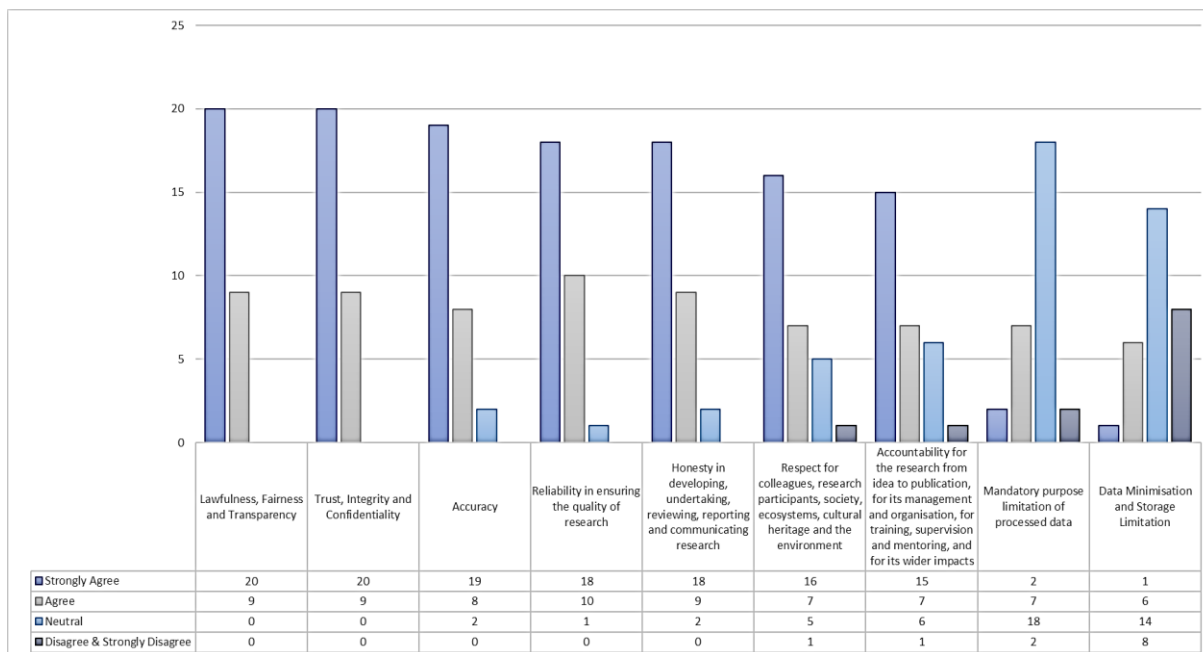


Figure 3: Legal & Ethical Principles Prioritisation

To provide further details, the survey results are described in detail in Table 2 below:

Table 2: Detailed Results of Legal & Ethical Principles

Principle	Strongly Agree		Agree		Neutral		Disagree & Strongly Disagree	
	Total	%	Total	%	Total	%	Total	%
Lawfulness, Fairness and Transparency	20	69.0%	9	31.0%	0	0.0%	0	0.0%
Trust, Integrity and Confidentiality	20	69.0%	9	31.0%	0	0.0%	0	0.0%
Accuracy	19	65.5%	8	27.6%	2	6.9%	0	0.0%
Reliability in ensuring the quality of research	18	62.1%	10	34.5%	1	3.4%	0	0.0%
Honesty in developing, undertaking, reviewing, reporting and communicating research	18	62.1%	9	31.0%	2	6.9%	0	0.0%
Respect for colleagues, research participants, society, ecosystems, cultural heritage and the environment	16	55.2%	7	24.1%	5	17.2%	1	3.4%

Accountability for the research from idea to publication, for its management and organisation, for training, supervision and mentoring, and for its wider impacts	15	51.7%	7	24.1%	6	20.7%	1	3.4%
Mandatory purpose limitation of processed data	2	6.9%	7	24.1%	18	62.1%	2	6.9%
Data Minimisation and Storage Limitation	1	3.4%	6	20.7%	14	48.3%	8	27.6%

Furthermore, respondents were asked about the priorities to achieving one or more of the TOPOS objectives in the second question and were given the opportunity to indicate at which level each priority should be progressed in the third question. As shown in Figure 4 below, the majority of the respondents identified **“Promotion of transport research data & publications”** as the most relevant priority. **“Common Interoperability framework within transport research community”** ranked second followed by (i) **“Cross-sector or multi-modal data harmonization and interoperability protocols/framework within transport research community”**, (ii) **“Personal & Proprietary (sensitive) data protection framework”**, (iii) **“Scientific product (e.g. data, software, etc.) review, evaluation and editing rights”** and (iv) **“Skills & Training”**.

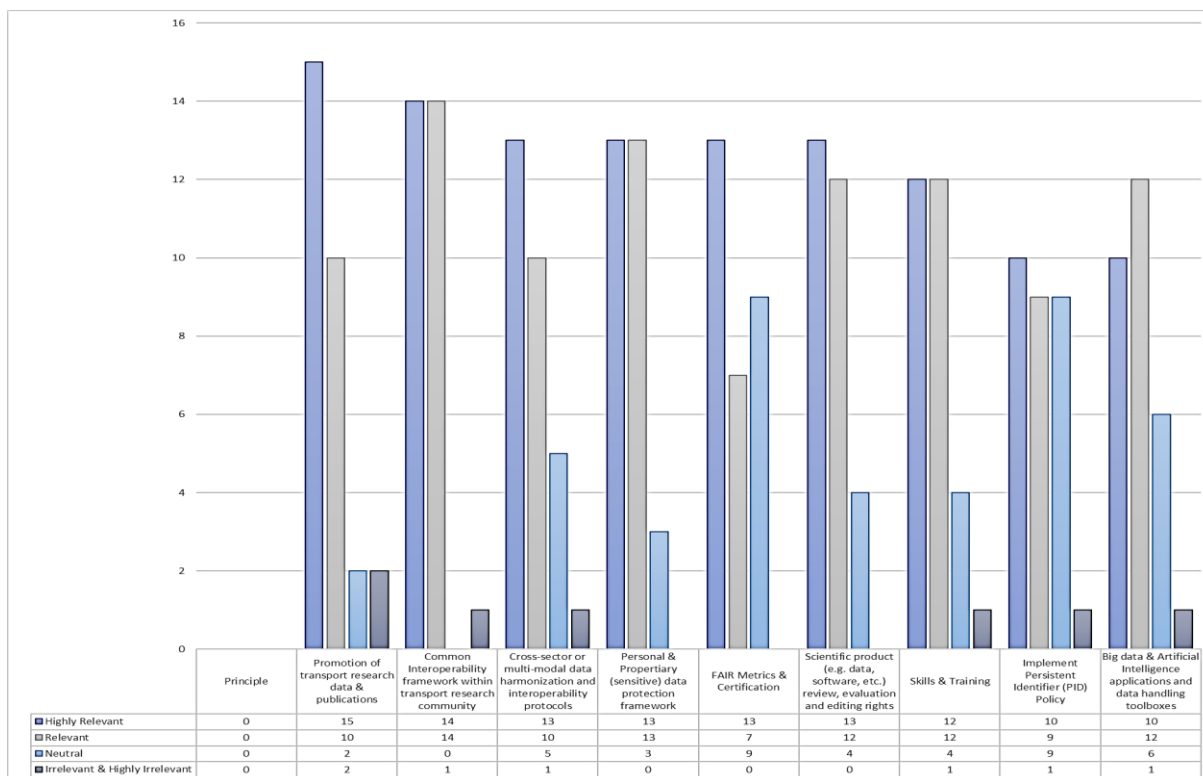


Figure 4: Open Science Priorities Prioritisation

To provide further details, the survey results are described in detail in Table 3 below:

Table 3: Open Science Priorities Questionnaire Results

Priorities	Highly relevant		Relevant		Neutral		Irrelevant & Highly irrelevant	
	Total	%	Total	%	Total	%	Total	%
Promotion of transport research data & publications	15	51.7%	10	34.5%	2	6.9%	2	6.9%
Common Interoperability framework within transport research community	14	48.3%	14	48.3%	0	0.0%	1	3.4%
Cross-sector or multi-modal data harmonization and interoperability protocols	13	44.8%	10	34.5%	5	17.2%	1	3.4%
Personal & Proprietary (sensitive) data protection framework	13	44.8%	13	44.8%	3	10.3%	0	0.0%
FAIR Metrics & Certification	13	44.8%	7	24.1%	9	31.0%	0	0.0%
Scientific product (e.g. data, software, etc.) review, evaluation and editing rights	13	44.8%	12	41.4%	4	13.8%	0	0.0%
Skills & Training	12	41.4%	12	41.4%	4	13.8%	1	3.4%
Implement Persistent Identifier (PID) Policy	10	34.5%	9	31.0%	9	31.0%	1	3.4%
Big data & Artificial Intelligence applications and data handling toolboxes	10	34.5%	12	41.4%	6	20.7%	1	3.4%

Defined cooperation standards & procedures within organizations	10	34.5%	12	41.4%	6	20.7%	1	3.4%
User research and data provision Environments	6	20.7%	18	62.1%	5	17.2%	0	0.0%
Rewards & Recognition schemes	6	20.7%	13	44.8%	9	31.0%	1	3.4%

Finally, based on the survey-outcome, the Table 4 presents at which level each priority should be progressed according to the respondents. When analysing the results of Table 4, a “top-down” approach on progressing the priorities to achieving one or more of the TOPOS Objectives is proposed by the majority of respondents. It is important to note that all priorities should be progressed from European to National/Regional and then to Institutional level. Indicatively, 82.8% of the participants support a “Common Interoperability framework within transport research community” to be progressed from a European level. Similarly, the priorities of “Promotion of transport research data & publications” and “FAIR Metrics & Certification” are supported by 79.3% to be progressed from a European level and the priority of “Cross-sector or multi-modal data harmonization and interoperability protocols” follows with 72.4%.

Analysing the results of Table 4, it is important to note that respondents proposed all priorities to be progressed from European either to National/Regional or to Institutional level.

Table 4: Open Science Priorities Questionnaire-Results

Priorities	Institutional		National/ Regional		European	
	Total	%	Total	%	Total	%
Implement Persistent Identifier (PID) Policy	6	20.7%	5	17.2%	18	62.1%
Cross-sector or multi-modal data harmonization and interoperability protocols	0	0.0%	8	27.6%	21	72.4%
Big data & Artificial Intelligence applications and data handling toolboxes	7	24.1%	6	20.7%	16	55.2%

Personal & Propertary (sensitive) data protection framework	5	17.2%	10	34.5%	14	48.3%
FAIR Metrics & Certification	1	3.4%	5	17.2%	23	79.3%
User research and data provision Environments	4	13.8%	10	34.5%	15	51.7%
Common Interoperability framework within transport research community	0	0.0%	5	17.2%	24	82.8%
Skills & Training	10	34.5%	8	27.6%	11	37.9%
Rewards & Recognition schemes	8	27.6%	10	34.5%	11	37.9%
Defined cooperation standards & procedures within organizations	10	34.5%	10	34.5%	9	31.0%
Promotion of transport research data & publications	1	3.4%	5	17.2%	23	79.3%
Scientific product (e.g. data, software, etc.) review, evaluation and editing rights	4	13.8%	6	20.7%	19	65.5%

1.3.2 Conclusion on Methodology

Overall, the code of conduct should consider the main legal and ethical principles as well as the priorities identified by transport research representatives, as they perceived them. This can help to achieve one or more objectives of transport research clouds such as the TOPOS Observatory and Forum.

Against the background that respondents apparently disagree with the concept of “*Data minimization and storage limitation*” (27.6%) and are rather neutral with the “*Mandatory purpose limitation of processed data*” (62.1%) it must be kept in mind that these are statutory and mandatory requirements which need to by law be followed when handling any personal data. Hence, the data minimisation and purpose limitation are strong requirements effectively hindering free and flexible use of personal data and as such are most likely opposed to by the participants of the survey. This opposition, however,

should not lead to the conclusion that these aspects are not of vital importance to Open Science in transport and will as such be covered in this deliverable.

Essentially, based on the outcome of the survey, the main areas of concern of transport researchers that should be regulated are defined in Figure 5. In particular, it puts in place the necessary procedures in order to avoid misbehaviours and unacceptable actions.

Legal and ethical principles

- Lawfulness, Fairness and Transparency
- Trust, Integrity and Confidentiality
- Accuracy
- Reliability in ensuring the quality of research
- Honesty in developing, undertaking, reviewing, reporting and communicating research

Priorities

- Promotion of transport research data & publications
- Common Interoperability framework within transport research community
- Cross-sector or multi-modal data harmonization and interoperability protocols
- Personal & Proprietary (sensitive) data protection framework
- FAIR Metrics & Certification
- Scientific product (e.g. data, software, etc.) review, evaluation and editing rights
- Skills & Training

Figure 5: Identified main Legal / Ethical Principles and Priorities

Last but not least, it is obvious that a “top-down” approach as shown in Figure 6, is proposed by the majority of respondents on progressing the priorities to achieving one or more of the TOPOS Objectives.



Figure 6: Top-down Approach

2 Developing the European Code of Conduct on Open Science in Transport

2.1 Determining and Reaching Stakeholders

The practical efficiency of a Code of Conduct as a regulatory and policy framework can only be achieved if the stakeholders are accurately identified, along with their individual needs. On this basis, for any form of promotion to be possible, it is essential that the mere existence of the code of conduct becomes common knowledge among these identified relevant stakeholders.

This raises the question of how respective stakeholders can be best identified and reached. The relevant Open Science in transport stakeholders have been determined across various BE OPEN deliverables and the key finding will be analysed and refined in order to develop a strategy to reach them. Here, the BE OPEN strategy for the dissemination of TOPOS observatory and forum tools can serve as groundwork. As illustrated in Figure 7 below, it contains the following steps:

- identify target groups;
- define key messages adapted for each target groups;
- identify how to reach these target groups;
- monitor the effect of the previous steps in order to continue in the same way and/or adapt when necessary.

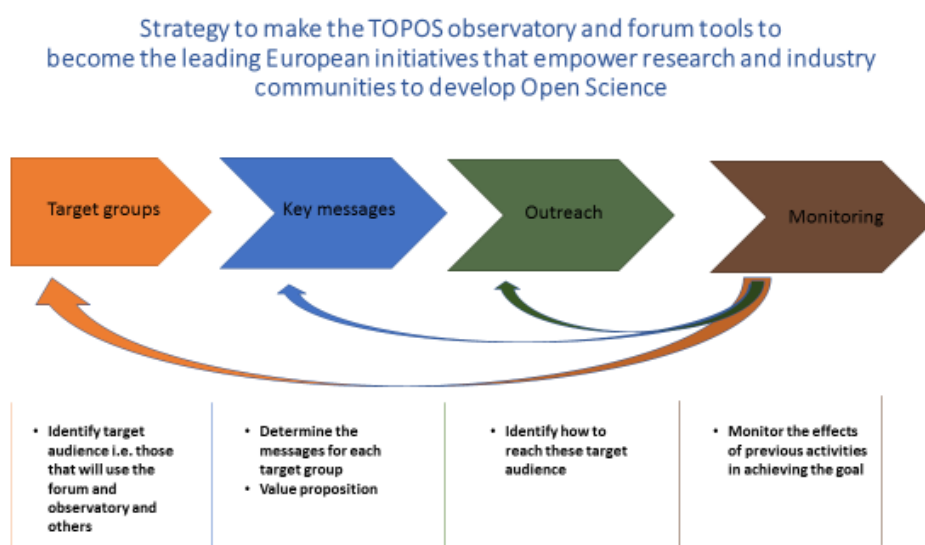


Figure 7: Dissemination Strategy for TOPOS Observatory and Forum Tools

2.1.1 Definition of Target Groups

In addition to the stakeholder-definition used for the survey covered in the methodology (Section 1.3.2), the key challenge lies in a detailed definition of target groups. Essentially this serves to determine who the respective stakeholders are and which challenges and needs they have concerning Open Science in transport. In essence, this allows for a conclusion on how the stakeholders can best be reached. In addition to the information on stakeholders provided in the methodology-section, the relevant Open Science in Transport stakeholders that either can affect or be affected by the implementation of an Open Science framework in transport have been identified and categorised cross various BE OPEN deliverables:

Taxonomy of primary key actors

A taxonomy of the key actors has been performed in the BE OPEN deliverable D 1.1¹². An initial list of stakeholders was developed, including:

- Primary targets:
 - research centres and universities,
 - industry
 - public authorities,
 - policy makers (regional, national and international level),
 - students,
 - scientists,
 - private and public researchers,
- Secondary targets
 - transport networks,
 - NGOs and community organisations,
 - commercial transport and logistics industry players, and
 - citizens.



Figure 8 TOPOS Target Audience

Target groups will be reached through the project partners and their involvement and engagement with various associations, organisations, as listed below:

¹² BE OPEN deliverable D 1.1 "Taxonomy of actors, terminology and experimental tools".

- Industry and technology organisations
 - European Road Transport Research Advisory Council (ERTRAC).
 - European Rail Research Advisory Council (ERRAC).
 - European Research and Innovation Platform for Waterborne Industries (WATERBORNE).
 - Advisory Council for Aeronautics Research in Europe (ACARE).
 - European construction technology platform (ECTP).
 - Alliance for Logistics Innovation through Collaboration in Europe (ALICE).
 - ARTEMIS Industry Association (ARTEMIS).
 - Conference of European Directors of Roads (CEDR).
- Research and academia organisations
 - European Conference of Transport Research Institutes (ECTRI).
 - Forum of European National Highway Research Laboratories (FEHRL).
 - Forum of European Road Safety Research Institutes (FERSI).
 - EUropean rail Research Network of Excellence (EURNEX).
 - European Association of Aviation Training and Educational Organisations (EATEO).
 - European Association of Universities in Marine Technology (WEGEMT).
 - European Association of Universities in Marine Technology (EARTO).
 - HUMANIST VCE.
 - European Automotive Research Partners Association (EARPA).
- Research Council of EU states.
 - European university association (EUA).
 - European university of technology (UNIV-TECH).
 - The European Consortium of Innovative Universities (ECIU).
 - European society for engineering education (SEFI).
 - Board of European students of technology (BEST).
- National public authorities
 - The ERANET initiative and TRIMIS and CORDIS tools.
 - National Agencies for Science, Innovation and Technology.

The Individual users of TOPOS tools are mostly defined as the members of research and academia organisations:

- Research Council of EU states.
- European university association (EUA).
- European university of technology (UNIV-TECH).
- The European Consortium of Innovative Universities (ECIU).
- European society for engineering education (SEFI).
- Board of European students of technology BEST.

Furthermore, a clustering of the sources reviewed was performed by type of research data and area of competence. More precisely, the three types of transport research data considered are original research data, operational data directly related to research and data from published transport research. Essentially, the following six competence areas have been defined:

- legal/regulatory,

- technological,
- transport planning,
- business modelling,
- socio-economic, and
- environmental

Considering these aspects, an importance/influence matrix was developed in order to prioritise which stakeholders are the most pivotal ones. In Table 5 below, the stakeholders by type of competence area and type of data are presented. The stakeholders included in the table present great interest to the topic and are categorised based on their power to influence or support each topic (high or low). Key stakeholders can be found in the first category (showing high interest and high influence power).

Table 5 Stakeholders by Competence Area and Type of Resource Used

Type of data	Influence	Competence Areas					
		Legal/Regulatory	Technological	Transport planning	Business modelling	Socio-economic	Environmental
Original Research Data	High	<ul style="list-style-type: none"> • Policy makers • Public authorities • Transport networks • Commercial transport and logistics industry players 	<ul style="list-style-type: none"> • Research centres and Universities • Commercial transport and logistics industry players 	<ul style="list-style-type: none"> • Research centres and Universities • Private researchers • Policy makers • Public authorities • Transport networks 	<ul style="list-style-type: none"> • Policy makers • Public authorities • Transport networks • Commercial transport and logistics industry players • Citizens 	<ul style="list-style-type: none"> • Research centres and Universities • Public authorities • Commercial transport and logistics industry players • NGOs and community organisations 	<ul style="list-style-type: none"> • Research centres and Universities • Policy makers • Public authorities • Transport networks • Commercial transport and logistics industry players
	Low	<ul style="list-style-type: none"> • Citizens 	<ul style="list-style-type: none"> • Researchers and students 	<ul style="list-style-type: none"> • Researchers and students • Citizens 	<ul style="list-style-type: none"> • Research centres and Universities 	<ul style="list-style-type: none"> • Citizens 	<ul style="list-style-type: none"> • Citizens
Operational data	High	<ul style="list-style-type: none"> • Public authorities • Policy makers (international level) 	<ul style="list-style-type: none"> • Public authorities 	<ul style="list-style-type: none"> • Public authorities 	<ul style="list-style-type: none"> • Public authorities 	<ul style="list-style-type: none"> • Public authorities • Transport networks • Commercial transport and logistics industry players 	<ul style="list-style-type: none"> • Public authorities
	Low	–	–	–	–	–	–
Data from published transport research	High	<ul style="list-style-type: none"> • Policy makers (regional and national level) • Public authorities 	<ul style="list-style-type: none"> • Policy makers • Public authorities • Transport networks • Commercial transport and logistics industry players 	<ul style="list-style-type: none"> • Policy makers • Public authorities • Transport networks • Commercial transport and logistics industry players 	<ul style="list-style-type: none"> • Policy makers (international level) • Public authorities • Transport networks • Commercial transport and logistics industry players 	<ul style="list-style-type: none"> • Policy makers (regional level) • Public authorities • Commercial transport and logistics industry players • NGOs and community organisations 	<ul style="list-style-type: none"> • Policy makers (regional and national) • Public authorities • Commercial transport and logistics industry players
	Low	<ul style="list-style-type: none"> • Research centres and Universities • Transport networks • Commercial transport and logistics industry players • NGOs and community organisations • Citizens 	<ul style="list-style-type: none"> • Research centres and Universities • Private researchers • NGOs and community organisations • Citizens 	<ul style="list-style-type: none"> • Research centres and Universities • Private researchers • NGOs and community organisations • Citizens 	<ul style="list-style-type: none"> • Research centres and Universities • Citizens • NGOs and community organisations 	<ul style="list-style-type: none"> • Research centres and Universities • Policy makers (national level) • Transport networks • Citizens 	<ul style="list-style-type: none"> • Research centres and Universities • Policy makers (international level) • Policy makers (international level) • Citizens • NGOs and community organisations

Prospective secondary target groups

In addition to the primary key actors determined above, the awareness of the code of conduct can further be supported by defining additional secondary targets once the code of conduct in ANNEX 1 has been published. To the extent additional targets can be determined in the course of time, the

definition for stakeholders in the code of conduct should be then amended accordingly as living document. To provide an outlook, the secondary targets could be determined through the following channels:

- **Publishing houses:** Raising awareness of the code of conduct can potentially be an essential aspect of the engagement strategy.
- **NGOs & community organisations / Existing transversal associations:** Creating links with European transport research associations can potentially enlarge the dissemination audience and ease the dissemination itself. The European Transport Research Alliance could largely be used for dissemination. It comprises of five¹³ European association, counting all together 105 European organisations in 37 countries including 44 Universities, 40 research organisations, 17 government organisations and four industrial partners.
- **EU and associated members countries:** Dissemination to this target could be made through workshops and all related events (scientific conferences, presentations, seminars, etc.) acting as opportunities to disseminate information about the code of conduct.
- **Transport networks.**
- **Commercial transport and logistics industry players.**
- **Citizens.**

2.1.2 Key Stakeholders' Needs as Basis for promoting the Code of Conduct

A closer analysis of the stakeholders' needs and known barriers can serve as important groundwork for any future dissemination strategy for the code of conduct. Valuable input can be found in the stakeholder survey performed in the BE OPEN deliverable D 1.2¹⁴ which can be used to evaluate the usage, knowledge and stakeholders needs for Open Science in the field of transport research. In turns, this can serve as solid basis to determine the stakeholders' needs and known barriers to overcome or at least loosen them by means of the code of conduct. Hence, the needs and barriers are important to determine the required content of the code of conduct in order to cater it to the stakeholders needs. Such barriers were subject of BE OPEN deliverables D 2.2¹⁵ and D 2.4¹⁶.

Turning towards the material content, on the one hand, the BE OPEN survey in deliverable D 1.2 showed that amongst stakeholders the general awareness, especially for Open Science and Open Data, is currently limited and prospectively needs to be raised. On the other hand, the level of awareness for Open Software tools and Open Access publications is higher and their usage is more common among these stakeholders. However, Open Access publications would be expected to be more widespread through conventional publishing platforms containing hybrid Open Access publications. Essentially,

¹³ European Conference of Transport Research Institutes – ECTRI, Forum of European National Highway Research Laboratories – FEHRL, Forum of European Road Safety Research Institutes – FERSI, European Rail Research Network of Excellence – EURNEX and HUMAN Centred Design for Information Society Technologies association – HUMANIST.

¹⁴ BE OPEN deliverable D 1.2 “Framework of common understanding of Open Science in transport sector”.

¹⁵ BE OPEN deliverable D 2.2 “Open/FAIR data, software and infrastructure in European transport research”.

¹⁶ BE OPEN deliverable D 2.4 “Governance and operational/business models for Open Science in European Transport research”.

there is a need to promote all Open Science topics, with a focus on Open Data, in order to raise the level of awareness and to engage more stakeholders.

The usage of Open Science, Open Data, Open Software and Tools and Open Access Publications is mainly dependent on how well-informed stakeholders are. In multimodal transport, the usage of Open Science seems to be slightly more common comparing to other modes of transport. It is also worth noting that most stakeholders use Open Data, while few of them create Open Data.

To draw a first conclusion: Stakeholders acknowledge the benefits of Open Science while also several limitations are highlighted. The main listed challenges are: lack of a common policy, time and monetary issues as well as immaterial benefit. Furthermore, data security and data quality are mentioned frequently. The solutions suggested to foster Open Science mainly consist of providing common understanding among all stakeholders, developing technical solutions for automatisisation and improving data quality as well as setting up the funding scheme to support stakeholders' contribution.

Based on BE OPEN deliverable D 2.4¹⁷, Figure 9 illustrates the twelve (12) main topics that were identified as important in order to promote Open Science in transport research.



Figure 9 Key Findings from BE OPEN Deliverable D 2.4: Barriers to overcome

In more detail, the main barriers to overcome in order to reach the envisioned stakeholders can be explained and described as follows:

- **Knowledge and awareness:** The lack of knowledge and awareness are a key issue that need to be overcome. There is an imminent need to train researchers on Open Science in general. In particular, it is important for them to learn which data other researchers find interesting and useful. Turning towards the mind-set of individuals, data ownership is a key issue in the debate regarding data sharing and the exactitude and reliability of data. To avoid individual researchers “thinking that they own their data”, it is suggested that the institutes take the lead in having solid internal procedures, enabling a cultural change.

¹⁷ BE OPEN deliverable D 2.4 “Governance and operational models”.

- **GDPR and “data ownership”:** Even if an institute creates a culture of sharing data, many institutes are more afraid of data privacy obligations under the GDPR than they ought to be. This is most likely based on the abstract fear of severely high GDPR fines. When it comes to transport research, GDPR requirements are not as high as e.g. health research, where data is of higher sensitivity. Given that some existing health-analysis platforms indeed have solved GDPR issues, these issues should be solvable in large parts of transport research as well.
- **Competitiveness:** In terms of competitiveness on the institutional level, there seems to be some cultural variations across fields of research. In the transport sector, much of the data comes from companies, who are not willing to share it openly to everyone due to competitive advantages. Equally, a large quantity of data collected by institutes on their own could be used as a competitive advantage to gain new projects.
- **Cost and time:** Cost and time were also mentioned as problematic in terms of sharing. This was also mentioned in the case studies from both public transport companies producing a large quantity of transport data. From its raw form, data needs to be shaped, processed and interpreted to either provide added value or be used in a decision-making process. Storage as well as, maintaining and ensuring data quality along with associated security and privacy aspect potentially results in high costs. The question of the responsibility for bearing these costs and/or for sharing needs to be addressed and considered when data is sold or exchanged.
- **Broad generation of data outside research:** Transport data is to a considerable extent generated through public and private companies outside of research, and they might have restrictive sharing policies.
- **Standardisation and quality:** In terms of using open data, reliability, relevance and accessibility of the material is the main barrier according to finding in BE OPEN deliverable D 2.2. There is a problem regarding diversity of standards and formats in the public transport world. This is both in regards to the data structure, but also the process involved. Different local, national and international regulatory frameworks may influence the exchange and release of data. There is also a gap between academia and industry, as mentioned by the transport organisations. Standardisation and quality control could increase the use of otherwise unused available data.
- **Openness vs. national/local sustainability:** There may be a dilemma between maximising openness to increase innovation and the possibility that global companies (which often do not pay any taxes locally) gain profit of locally produced data without giving anything in return. This problem is also relevant in terms of competition from private companies locally, which may not have the same goals as public transport operators in terms of customer satisfaction and local sustainability. There seems to be little regulation targeting such type of behaviour.
- **Security:** Sharing transport data is potentially a security issue. The potential consequences of sharing must be mapped and analysed to find solutions that ensure substantial openness without entailing societal risks.
- **Open publication and Coalition S¹⁸:** The European Transport organisations state that open publications are often found to be of poor quality and, at the moment, there is the feeling that the full potential is not being reached.

¹⁸ Alliance of 11 EU countries agreeing to openly publish research from public funds.

- **Practical expectations for the cloud:** The practical expectations for the EOSC Cloud is quite similar among the research community and transport organisations. A secure and safe environment for transaction of data is important. As shown in BE OPEN deliverable D 2.2, the main reason for not using Open Software is the low security, which could potentially be solved by EOSC, if the possibility of analysing data inside the cloud system will be a reality. Furthermore, easy navigation is required in order to enable that information (datasets) available are at all easily findable.
- **Marketing:** There is a need to focus on marketing to be able to make this a functional cloud system for sharing.
- **Common vocabulary:** Using the transport research organisations to increase positive attitudes towards Open Science and sharing a data, open publications and infrastructure seems to be a possible way to increase involvement in the transport sector. A common vocabulary is required in order to understand and formalise the relevant information and related attributes that can contribute to create useful and measurable information by combining, integrating and linking data from various sources.

2.1.3 Key Messages

Key messages for the target customers have been defined in BE OPEN deliverable D3.4¹⁹. The messages were developed based on the needs of these customers. The target messages will be used in discussions and communication with stakeholders. They could also be used among others as headlines, e.g., at the beginning of some writing about TOPOS, at the end of the writing, or near/close to the project logo, or separately in parenthesis in a flyer. The key messages for the target audiences and the tools/channels to be used to reach them are summarised in Table 6 below.

Table 6 Key Messages for the Target Audience

Target audience	Key messages	Tools
Research organisations	TOPOS Observatory will provide research organisations with <ol style="list-style-type: none"> the possibility to make their research efforts and results visible and comparable throughout Europe and beyond. the possibility of finding new research collaborations in upcoming projects and new opportunities to use those data. 	Workshops, Training, Presentation at conferences, Publications in journals, Newsletters, Social Media, Website, Flyer, Infographics
Industry	TOPOS will help the business sector <ol style="list-style-type: none"> find experts and specialists in specific areas needed for their further business development and data science. enter new collaborations with experts as e.g., in research 	Through memberships in relevant ETPs, associations and organisations, workshops, training, presentation at conferences, publications in journals, newsletters, social media

¹⁹ BE OPEN deliverable D 3.4 “Strategy for pan-European diffusion and global links”.

	projects to complement their portfolio with innovative solutions	
Public authority	<p>a. As content consumer: publicly available data can be shared and linked to other gathered information. Together a wider range of usability of those combined data is feasible.</p> <p>b. As content provider: interface with Open Government Data appreciated</p>	Presentations at conferences, newsletters, press release
Policy makers	Sound decisions can be made, based on reliable data analyses and correlations. A bigger set of data strengthens the message of the data analytics and its findings.	Presentations at conferences, newsletters, press release
Professors	<p>Scientific excellence is driven by better quality data and larger quantities. Therefore, any arrangement to increase the data sets gives the opportunity to deliver more significant outputs.</p> <p>More specific focus on exploitations or new research areas.</p>	<p>All the tools & channels described for research organisations</p> <p>Newsletter forwarded universities</p> <p>Social media – LinkedIn</p>
Researchers	<p>Active participation in and contribution to the TOPOS Observatory will help in:</p> <p>a. getting academic visibility and attention.</p> <p>b. getting a platform to discuss research results with a bigger community which will also ensure higher quality of data and therefore contribute to data integrity.</p> <p>c. getting more quotes for scientific work.</p> <p>d. finding new scientific collaborations.</p> <p>e. creating new ideas for future projects.</p>	Presentations at conferences Flyer
Scientists	<p>See the 'Professors' category, with a stronger focus on the data handling and analytics.</p> <p>"How to get large data amounts, processed in less time?" – could be one of the scientists "drivers".</p>	
Students	Using TOPOS for desk research will help to facilitate state of the art research in transport and therewith avoiding duplication of research efforts and potential plagiarism.	

2.1.4 Conclusion on determining and reaching Stakeholders

Stakeholders use Open Data for different purposes and there is a need to provide compatible Open Data allowing stakeholders to use the data faster and in a flexible way. Additionally, a common policy and clear guidelines are needed in order to ensure the quality of data. For better use of Open Science and Open Data, measures and actions for data protection and security need to be transparent. Furthermore, closely connected to intellectual property rights, funding schemes providing the necessary resources are essential as return for stakeholders' contributions to Open Science. Finally, implementing technical solutions and focusing on automation processes can help to reduce stakeholders' costs and time. For all the aforementioned actors, support at European and national level is needed.

In essence, a code of conduct cannot solve all determined barriers for a wide range of determined stakeholders. Notwithstanding, the code of conduct can be a first step towards promoting Open Science by providing a policy framework establishing ground rules for adherence to fundamental research principles and ethical standards, along with legal compliance standards and acknowledgement of safety standards and intellectual property rights. Since these barriers can be best overcome if as many stakeholders as possible show their commitment to the code of conduct, a broad definition of potential stakeholders is needed in order for all stakeholders to contribute to providing a framework ensuring compliance, trust and quality of data.

2.2 Living Document Description

ANNEX 1 of this BE OPEN deliverable D 4.4 holds the initial version of the proposed “European Code of Conduct on Open Science in Transport”. It was developed by the contribution of all beneficiaries of BE OPEN H2020 project, the project's SC members and finally acknowledged and approved by an executive Advisory Board, which consists of an international group of experts, specialised in both Transport Research and Open Science sectors. The code of conduct is a living document that will be updated every three to five years and revised as necessary by an Expert Working Group/Committee that will be formed by the BE OPEN SC members after the end of the BE OPEN project.²⁰ This revision is vital, as it will implement evolving concerns, challenges and opportunities in transport research. Subsequently, this document will continue to serve the transport research community as a framework for good research practice. At this stage (Mid 2021), the code of conduct may still be subject to future changes.

The “European Code of Conduct on Open Science in Transport” as a living document aims to:

- establish amendments and keep the living document updated based on transport research community's trends and needs in parallel with the latest Open Science developments;
- promote opening discussions on procedures or arrangements for monitoring and implementing the living document through coordinated workshops, webinars and other related events in order to strengthen the latest version of the code of conduct;

²⁰ Details on this Expert Working Committee on Open Science and Ethics in Transport (EWCOSSET) are provided in the following.

- update beneficiary terms to align with fundamental research, ethical and legal compliance principles; and
- add actions/processes to strengthen the role of code of conduct within the transport research community.

The BE OPEN SC will consult to shape the Expert Working Committee on Open Science and Ethics in Transport (EWCOSSET) that will be concerned with a wide range of “internal” (within transport research community) and “external” issues (relations between science and society) and respect existing ethical guidelines. Since ethical considerations have been an essential component in the consolidation of a united Europe, EWCOSSET will be established in order to bring together experts from transport research and Open Science academia across Europe and provide them with a platform (TOPOS Observatory & Forum) for continuous debate on transport research ethics and integrity. The EWCOSSET will meet and will convene thematic meetings in wider settings, typically in partnerships with other relevant organisations such as the European Commission, the European Science Foundation (ESF), the European Open Science Cloud (EOSC) Governance Board, the International Council for Science (ICSU), and UNESCO, among many others. The members of the EWCOSSET will rely on their extensive network of experts and institutions for the successful execution of the revision process of “European Code of Conduct on Open Science in Transport”.

Before the establishment of the EWCOSSET, the BE OPEN SC will be responsible to keep the code of conduct a living instrument by conducting interviews, surveys, webinars and other similar events to engage key transport research stakeholders and implement evolving challenges, barriers and opportunities which arise in transport research and Open Science. In the same context, joint projects (and future relevant projects) may also raise comments or remarks on the code of conduct to set it in motion. Due to the COVID-19 outbreak, several major implications occurred which lead to creating a questionnaire, which targeted transport research associations involved in the BE OPEN project²¹ instead of live workshops or webinars. For this reason, the BE OPEN SC will be responsible for the proper engagement of all interested transport research stakeholders through workshops, online interviews or webinar after the end of the BE OPEN project in order to further assess and update the current version of the living document.

2.3 Explanation of Scope, Content and Background Information

In order to fulfil the requirement of a living document and to reach the envisioned stakeholders, the European Code of Conduct on Open Science in Transport needs to be easily accessible by all potential stakeholders, requiring the information to be as precise and brief as possible. This in turns requires the material aspects of the code of conduct to be understandable stand-alone, meaning without knowledge of the full BE OPEN deliverable D. 4.4.

Hence, this requires the material code of conduct to be independent and detachable from the BE OPEN deliverable D 4.4. This has been achieved by moving the “European Code of Conduct on Open Science in Transport” to ANNEX 1 of this deliverable while the main body of this deliverable and especially this section 2.3 describes the content of the material code of conduct and provides for additional

²¹ See Section 1.3.2.

background information. Thus, essentially ANNEX 1 holds the first of many versions of the “European Code of Conduct on Open Science in Transport” as a living and evolving document.

The following information relates to the material Articles of Chapter 1 (Fundamental Research Principles) and Chapter 2 (Legal Compliance Principles) of the initial “European Code of Conduct on Open Science in Transport”, which can be found in ANNEX 1.

2.3.1 Fundamental Research Principles

Fundamental principles of research integrity have a long-standing history within all fields of science and were subject to the assessment in BE OPEN deliverable D 4.1. Research integrity is defined as adherence to ethical principles and professional standards for responsible research practices, which mainly consist of honest and verifiable methods in proposing, conducting and evaluating research. For the individual researcher, this integrity is an aspect of moral nature and experience, while for institutions it is about creating an environment that promotes responsible behaviour by setting standards of excellence and trustworthiness.²²

While most universities around the world establish and publish individual guidelines on research integrity²³, within the scope of Open Science, multilateral fundamental principles of research integrity are of great importance. As such, also the EU Commission has been engaging in activities to determine unified principles of research integrity, also within the Horizon 2020 programme.²⁴

As essential groundwork in this field and in cooperation with the EU Commission, a “European Code of Conduct for Research Integrity”²⁵ has been developed by the European Federation of Academies of Sciences and Humanities, consisting of 59 academies from more than 40 countries (ALLEA). Further important groundwork can be found in the EOSC Rules of Participation²⁶.

Aspects from both of these sources shall be applied to the specifics of the Open Science in transport field and then be included as aspects of the European Code of Conduct on Open Science in Transport.

2.3.1.1 ALLEA Code of Conduct

Description of ALLEA Code of Conduct

The European Code of Conduct for Research Integrity was developed by ALLEA with the aim to help the research community preserve research integrity and to provide a framework for self-regulation.

²² Francisco/Hahn/Schwarz, “Editorial Wissenschaftliche Integrität”, onlinelibrary.wiley.com/doi/10.1002/ange.201700613, last accessed 12 May 2021.

²³ See e.g. Guidance on Research Integrity by Harvard University, vpr.harvard.edu/pages/research-integrity, last accessed 12 May 2021.

²⁴ See e.g. Research Integrity in Horizon2020, ec.europa.eu/programmes/horizon2020/en/news/commission-moves-strengthen-research-integrity, last accessed 12 May 2021.

²⁵ ALLEA, The European Code of Conduct for Research Integrity, Revised Edition, <https://allea.org/wp-content/uploads/2017/05/ALLEA-European-Code-of-Conduct-for-Research-Integrity-2017.pdf>, last accessed 12 May 2021.

²⁶ EOSC rules of participation (2021), <https://op.europa.eu/en/publication-detail/-/publication/a96d6233-554e-11eb-b59f-01aa75ed71a1/language-en/format-PDF/source-184432576>, last accessed 12 May 2021.

The European Code of Conduct describes, professional, legal and ethical responsibilities, and acknowledges the importance of the institutional settings in which research is organised.

ALLEA has recognised four fundamental principles of research integrity, aiming to guide researchers in their work. These principles are reliability, honesty, respect and accountability, which all apply to the Open Science framework. Based on ALLEA, **reliability** refers to ensuring the quality of research through design, methodology, analysis and use of resources. **Honesty** should be reflected in the transparent, fair, full and unbiased way of developing, undertaking, reviewing, reporting and communicating research. **Respect** should be ensured for the colleagues, research participants, society, ecosystem, cultural heritage and the environment. Finally, **accountability** refers to all levels of research, from research management and organisation, training, supervision and mentoring, up to its wider impacts.

The ALLEA code of conduct defines good research practices that are applied at all stages of research and refer to both research institutions and researchers. These good research practices are separated in the following eight contexts and are shown in detail in the following table:

- Research Environment
- Training, Supervision and Mentoring
- Research Procedures
- Safeguards
- Data Practices and Management
- Collaborative Working
- Publication and Dissemination
- Reviewing, Evaluating and Editing

Assessment of ALLEA Code of Conduct good research practices

The BE OPEN “European Code of Conduct on Open Science in Transport” shall in no way contradict the ALLEA code of conduct but shall rather meaningfully supplement it emphasising on the Open Science in transport research context. For this purpose, an initial assessment of the good research practices included in the ALLEA code of conduct is attempted. This is focused on the relevance for Open Science particularities, assessing in detail the practices that are closer and directly related to Open Science procedures and will only briefly touch such aspects that are less relevant for the Open Science and rather only touch the general context of proper research behaviour. This relevance is displayed in Table 7.

Table 7 Good Research Practices of ALLEA Code of Conduct and Assessment of their Relevance to Open Science Context
(●-more relevant, ○-less relevant)

Good Research Practices	Relevance
Research Environment	
Research institutions and organisations promote awareness and ensure a prevailing culture of research integrity.	●
Research institutions and organisations demonstrate leadership in providing clear policies and procedures on good research practice and the transparent and proper handling of violations.	●
Research institutions and organisations support proper infrastructure for the management and protection of data and research materials in all their forms (encompassing qualitative and quantitative data, protocols, processes, other research artefacts and associated metadata) that are necessary for reproducibility, traceability and accountability.	●

Good Research Practices	Relevance
Research institutions and organisations reward open and reproducible practices in hiring and promotion of researchers.	○
Training, Supervision and Mentoring	
Research institutions and organisations ensure that researchers receive rigorous training in research design, methodology and analysis.	○
Research institutions and organisations develop appropriate and adequate training in ethics and research integrity to ensure that all concerned are made aware of the relevant codes and regulations.	●
Researchers across the entire career path, from junior to the most senior level, undertake training in ethics and research integrity.	●
Senior researchers, research leaders and supervisors mentor their team members and offer specific guidance and training to properly develop, design and structure their research activity and to foster a culture of research integrity.	●
Research Procedures	
Researchers take into account the state-of-the-art in developing research ideas.	○
Researchers design, carry out, analyse and document research in a careful and well-considered manner.	●
Researchers make proper and conscientious use of research funds.	
Researchers publish results and interpretations of research in an open, honest, transparent and accurate manner, and respect confidentiality of data or findings when legitimately required to do so.	●
Researchers report their results in a way that is compatible with the standards of the discipline and, where applicable, can be verified and reproduced.	●
Safeguards	
Researchers comply with codes and regulations relevant to their discipline.	●
Researchers handle research subjects, be they human, animal, cultural, biological, environmental or physical, with respect and care, and in accordance with legal and ethical provisions.	○
Researchers have due regard for the health, safety and welfare of the community, of collaborators and others connected with their research.	○
Research protocols take account of, and are sensitive to, relevant differences in age, gender, culture, religion, ethnic origin and social class.	○
Researchers recognise and manage potential harms and risks relating to their research.	●
Data Practices and Management	
Researchers, research institutions and organisations ensure appropriate stewardship and curation of all data and research materials, including unpublished ones, with secure preservation for a reasonable period.	●
Researchers, research institutions and organisations ensure access to data is as open as possible, as closed as necessary, and where appropriate in line with the FAIR Principles (Findable, Accessible, Interoperable and Re-usable) for data management.	●
Researchers, research institutions and organisations provide transparency about how to access or make use of their data and research materials.	●
Researchers, research institutions and organisations acknowledge data as legitimate and citable products of research.	●
Researchers, research institutions and organisations ensure that any contracts or agreements relating to research outputs include equitable and fair provision for the management of their use, ownership, and/or their protection under intellectual property rights.	●
Collaborative Working	
All partners in research collaborations take responsibility for the integrity of the research.	○
All partners in research collaborations agree at the outset on the goals of the research and on the process for communicating their research as transparently and openly as possible.	●
All partners formally agree at the start of their collaboration on expectations and standards concerning research integrity, on the laws and regulations that will apply, on protection of the intellectual property of collaborators, and on procedures for handling conflicts and possible cases of misconduct.	●
All partners in research collaborations are properly informed and consulted about submissions for publication of the research results.	●
Publication and Dissemination	
All authors are fully responsible for the content of a publication, unless otherwise specified.	●
All authors agree on the sequence of authorship, acknowledging that authorship itself is based on a significant contribution to the design of the research, relevant data collection, or the analysis or interpretation of the results.	○
Authors ensure that their work is made available to colleagues in a timely, open, transparent, and accurate manner, unless otherwise agreed, and are honest in their communication to the general public and in traditional and social media.	●

Good Research Practices	Relevance
Authors acknowledge important work and intellectual contributions of others, including collaborators, assistants, and funders, who have influenced the reported research in appropriate form, and cite related work correctly.	○
All authors disclose any conflicts of interest and financial or other types of support for the research or for the publication of its results.	○
Authors and publishers issue corrections or retract work if necessary, the processes for which are clear, the reasons are stated, and authors are given credit for issuing prompt corrections post publication.	○
Authors and publishers consider negative results to be as valid as positive findings for publication and dissemination.	○
Researchers adhere to the same criteria as those detailed above whether they publish in a subscription journal, an open access journal or in any other alternative publication form.	●
Reviewing, Evaluating and Editing	
Researchers take seriously their commitment to the research community by participating in refereeing, reviewing and evaluation.	○
Researchers review and evaluate submissions for publication, funding, appointment, promotion or reward in a transparent and justifiable manner.	○
Reviewers or editors with a conflict of interest withdraw from involvement in decisions on publication, funding, appointment, promotion or reward.	○
Reviewers maintain confidentiality unless there is prior approval for disclosure.	○
Reviewers and editors respect the rights of authors and applicants, and seek permission to make use of the ideas, data or interpretations presented.	○

In essence, the most relevant good research practices of the ALLEA code of conduct to be reflected in the BE OPEN “European Code of Conduct on Open Science in Transport” are summarised as follows:

- The research environment should be supportive in the promotion and assurance of the culture of research integrity, by providing clear policies and procedures to this direction, as well as the proper infrastructure for the management and protection of data and research materials.
- Research institutions should develop appropriate and adequate training in ethics and research integrity, covering research design, methodology and analysis, which apply to all levels of researchers, with the more senior ones being encouraged to mentor properly their teams to this direction.
- Concerning the research procedures, researchers are recommended to handle research processes in a well-considered manner, starting from developing research ideas, the design, analysis and documentation of the research, the use of research funds until the publication and reporting of their results. The publication of research results is recommended to be open and honest, respecting in parallel confidentiality of data or findings. Reporting of results should be compatible with the standards of the discipline, easing also their verification and reproducing by other researchers.
- Safeguards are related to the obligation of researchers to comply with codes and regulations of their discipline, taking into account legal and ethical provisions, recognition and management risks of their research work. Research protocols should also take into account differences related to age, gender, culture, religion, ethnic origin and social class.
- As far as data practices and management are concerned, researchers, research institutions and organisations should ensure appropriate stewardship and curation of all data and research materials. Additionally, they should ensure access to data is as open as possible, as closed as necessary, and in line with the FAIR Principles. Transparency is needed in the way they access or use their data and research materials, with data being acknowledged as legitimate and citable products of research. Any contracts or agreements relating to research outputs should

include fair provision for the management of their use, ownership, and/or their protection under intellectual property rights.

- Regarding publication and dissemination of the results, all authors are responsible for the content of the publication, acknowledging contribution of others and cite related work properly. Any conflicts of interest or financial support for the research should be disclosed, post publication corrections are encouraged under clear processed and with full documentation. Finally, the same criteria are applied concerning the publication in a scientific journal, either it is a subscription or open access and of any other publication form journal.
- The last section concerns the review, evaluation and editing of research results. Researchers are recommended to participate in the refereeing, reviewing and evaluating process conscientiously and in a transparent manner, maintaining in parallel confidentiality and respecting rights of authors.

2.3.1.2 EOSC Rules of Participation

Description of EOSC Rules of Participation

In October 2020, the Rules of Participation Working Group of EOSC defined the Rules of Participation (V0.5) in an attempt to enhance openness, quality and trust in the tools and services offered by the European Open Science Cloud (EOSC). The main principles presented are iterative development, responsibility, applicability and genericity. Iterative development stands for the iterative process that Rules of Participation follow within their development and responsibility indicates that EOSC governance is responsible to adopt them. As EOSC includes several sources, the applicability of the Rules of Participation should be ensured for data, services, software, tools, etc. As such, the Rules of Participation are formulated in a generic level offering a set of rules capable to be implemented across EOSC and presented in Table 8 below.

Table 8 EOSC – The 8 Rules of Participation

N°	Rule
1	EOSC is based on the principle of openness.
2	EOSC data align with FAIR principles.
3	EOSC services align with EOSC architecture & interoperability guidelines.
4	EOSC is based on principles of ethical behaviour and integrity.
5	EOSC users are expected to contribute to a successful EOSC and active EOSC community.
6	EOSC users adhere to the terms of use of the resources they use.
7	EOSC users reference the resources they use in their work.
8	Participation in EOSC is subject to the policy and legislation of the EU.

Assessment of EOSC Rules of Participation

The BE OPEN “European Code of Conduct on Open Science in Transport” should also take into consideration the EOSC Rules of Participation, since the developed *TOPOS Observatory & Forum* tools aim to be aligned with EOSC and up to now reports by EOSC Partnership have been carefully examined. This top-down approach has been defined as the most appropriate in an attempt to express the

different dimensions of Open Science in transport research, based on the several Open Science initiatives that exist at a European level.

- EOSC is based on the principle of openness: EOSC is as open as possible for all sources (i.e. data, services, software, tools, etc.).
- EOSC data align with FAIR principles: EOSC is as FAIR as possible for all sources (i.e. data, services, software, tools, etc.) in terms of both content and interoperability.
- EOSC services align with EOSC architecture & interoperability guidelines: EOSC tries to build proper infrastructure that could provide integration of data and services eliminating geographical and disciplinary boundaries. Metadata schemes are used to describe services in order to include proper terms of use for each offered service.
- EOSC is based on principles of ethical behaviour and integrity: EOSC enhances openness and also respects resource providers, funding EOSC and third parties. Penalties are imposed to users violating EOSC ethical principles.
- EOSC users are expected to contribute to a successful EOSC and active EOSC community: EOSC has a two-fold role offering access to resources and improving the quality of offered services by using the new material that users provide to EOSC.
- EOSC users adhere to the terms of use of the resources they use: resources offered by EOSC do not change ownership and the terms of use defined by the owner are followed without exceptions.
- EOSC users reference the resources they use in their work: EOSC underlies the critical role of PIDs as they could be used to refer efficiently the work offered through it. References should be provided for any submitted work.
- Participation in EOSC is subject to the policy and legislation of the EU: EOSC is a European initiative and European legislation and policy are imposed.

Following the EOSC policies and procedures that enable openness and trust, researchers can utilise EOSC resources for their research and benefit from this interaction; in return, they can offer and deliver their research resources. Research institutions and organisations can also promote the use of EOSC, utilising its resources to improve their user-experience. In addition, EOSC can provide training materials and consultancy to researchers in order to support its use addressing issues of supervision and monitoring. Finally, in order to ensure quality and enhance trust of EOSC users, researchers should provide their data in EOSC using a formalised manner that allows interpretation, communication and processing.

2.3.1.3 Research Principles related to Open Science in Transport

Based on the analysis of ALLEA good research practices and following the EOSC Rules of Participation, the following research principles are suggested for the BE OPEN “European Code of Conduct on Open Science in Transport”:

Research Environment

- Research institutions and organisations promote Open Science and ensure a culture of research integrity.
- Research institutions and organisations provide clear policies and procedures on research principles related to Open Science.

- Research institutions and organisations provide proper infrastructure for the implementation of all Open Science related procedures.

Training, Supervision and Mentoring

- Research institutions and organisations ensure that researchers receive proper training in implementing science in an open manner.
- All researchers undertake training in ethics and research integrity when sharing or reusing data and research materials.

Research Procedures

- Researchers publish research results in an open and honest manner, respecting confidentiality of data or findings, when required.
- Researchers report their results in a way that is compatible with the standards of the Open Science framework (at European level), so that they can be verified and reproduced.

Safeguards

- Researchers conduct research and handle research subjects in accordance with legal and ethical provisions.
- Open Science protocols take account of relevant differences in age, gender, culture, religion, ethnic origin and social class.

Data Practices and Management

- Researchers, research institutions and organisations ensure access to data is as open as possible, as closed as necessary, and where appropriate in line with the FAIR Principles.
- Researchers, research institutions and organisations provide transparency about how to access or make use of open data and research materials.
- Researchers, research institutions and organisations acknowledge data as legitimate and citable products of research.

Collaborative Working

- All partners in research collaborations agree on the process for communicating their research in an open manner.

Publication and Dissemination

- All authors are honest when communicating openly their research to the general public.
- The same criteria of publication (acknowledgments, citations, conflicts of interest etc.) should be applied for subscription journals, open access journals or in any other alternative publication form.

Reviewing, Evaluating and Editing

- Open peer review and evaluation of submissions for publication, funding, appointment, promotion or reward should be conducted in a transparent and justifiable manner.

2.3.2 Ethical Principles and Business Models

It is greatly important that individuals and organisations involved in Open Science in transport activities commit to good practices, working methods and respect ethical principles associated with their field. Violations of these aspects may lead to a disrespectful environment among the stakeholders and can eventually lead to severe professional and potentially even legal consequences. Most commonly, such violations have the potential to damage existing procedures among stakeholders, degrade relationships among them, undermine trust in and the credibility of research and may expose research subjects, users, society or the environment to unnecessary harm.

2.3.2.1 *Determination of Ethical Principles*

Ethical concerns related to Open Science in transport research have been greatly discussed in various deliverables of the BE OPEN project. In most cases, the ethical concerns have been recorded as barriers that should be taken into account and be overcome for the implementation of Open Science policies at institutional, national and European level. The deliverable BE OPEN D 4.1 has provided a definition of ethical concerns and has separated legal and non-legal aspects of ethical concerns. However, this shall not obscure the fact that in most legal systems there is a close connection between ethical aspects and legal jurisdiction. In the field of Open Science, this strong connection between legal and ethical aspects is mainly found in legal aspects of IPR, data protection and data confidentiality.

Notwithstanding, BE OPEN deliverable D 4.1 has also identified ethical concerns that are not directly related to legal issues, but are rather strongly related to the established principles of ethical research, including respect for the autonomy of individuals, justice and beneficence. These identified non-legal ethical aspects can be briefly described as follows:

Misappropriation, misinterpretation and illegitimate unintended secondary use

- Practical aspects of misinterpretation may arise when data is further processed in “out of context” topics/fields, and used for purposes for which the initial authors and involved researchers have not agreed upon.
- Illegitimate unintended secondary use of data can ultimately lead to stigmatisation, discrimination and other physical damage to individual’s health and wellbeing, especially when sensible data is involved.
- Illegitimate unintended secondary use of data can harm the reputation of an individual researcher or even the entire associated institution.

Dual use

- Misappropriation and ill intent of secondary use of research data can lead to discrimination for an individual researcher or even the entire associated institution and even lead to a significant crisis.

Unequal distribution of research results

- All involved research parties (institutions and individual researchers) gain unequal benefits/rewards.

- Less developed countries or institutions lacking technical capabilities cannot access publicly open transport research data.
- Research groups or individuals with limited technical capacities to use available transport research data may be discouraged.

Commercialisation

- Steered or biased research interests/focus areas by private companies that affect public research institutions (i.e. universities).
- Dependence of research entities to private sector due to funding schemes.
- Industrialisation of universities' research outcomes (i.e. start-ups).
- Secondary use of research data from public research institution by a private company and unequal monetary benefits from research data produced.

Restriction of scientific freedom

- Lead science to certain monetary valuable directions.
- Restriction of available state-of-the-art IT and research tools.

2.3.2.2 Interaction with Business Models

As especially the abovementioned aspects on commercialisation have shown, ethical principles may interact or have an influence on business models. Therefore, this section focusses on the business models recorded within the context of the BE OPEN project. Hence, in the following paragraphs they will be assessed, based on the aforementioned ethical aspects, as well as fundamental research principles in general.

Business models related to open science framework

The purpose of the business model frameworks is to aid in the definition of an approach that an organisation would use towards the definition of its business value streams. In deliverable D 4.3²⁷ of the BE OPEN project, the most commonly used business model frameworks have been identified and a list of business models relevant to open data or open access policy has been developed. The most commonly used frameworks are:

- Business reference model
- IBM's Component Business Model
- Business Model Canvas
- Open Business Model Canvas.

The business models have been grouped according to the user categories who design, use or create value of open access data. These user groups as identified in the BE OPEN deliverable D 4.3 are the open data providers, who issue and distribute open data; the intermediaries-service providers, who offer services on open datasets and act as intermediaries between the open data providers and end

²⁷ BE OPEN deliverable D 4.3 "New business models to implement Open Access in transport research".

users; service developers and infrastructure providers - enablers, who are responsible for producing value for the final user and the final consumers-users, who consume the generated work.

The first list of business models taking open access into consideration is presented below. It includes business models that are designed and used by open access data providers and/or intermediaries and/or users:

- Freemium: a model through which an organisation provides a basic set of features of its product(s)/service(s) free of charges a premium for advanced and/or supplemental features.
- Premium: aims at providing high-end products/services, with brand positioning being one of its key elements.
- Open source: used by organisations that offer open source code, meaning that anyone can access, edit and distribute it. The source code is offered free of charge and can later be charged on an “added-value” basis. Another approach that emerged through open source offering is dual licensing.
- Demand-oriented platform: adopted by businesses offering customised open datasets through platforms capable of converting open datasets into valuable data streams. The outcome is free and open, and the revenue is generated by the provision of advanced services and refined datasets and data flows.
- Supply-oriented platform: provides maintenance services and easy access to their customers, usually in return for a monthly fee determined by the level of solution sophistication and technical parameters and quantitative parameters that have an impact on the price of the data.
- Razor and Blades: selling a starter product at an attractive price or giving it out for is the “razor” in terms of this particular business model, whereas the later encouragement of users to follow-up their initial purchase with additional products and/or services is the “blade”.
- Free, as branded advertising: aims at leading the customer to a specific brand, by making brand's data accessible.
- White-label development: the product/service is built at first by one organisation and then customised by another one.

On the other hand, business models that are mainly oriented to address open access data providers' needs, so that they are able to create value from open data are the following:

- Sponsorship: a product/service is made available free of charge through the provision of money from sponsors.
- Supporting primary business: open data acts as the tool that enables an organisation to develop their core operations, by making their product/service better and adds revenue to the organisation's primary business.
- Dual licensing: existence of two licences, one free and one paid for, for the same product/service, differentiated by certain conditions.
- Charging for changes: public bodies are collecting data from organisations and individuals required to make their data available for government use. These public bodies can then charge administrative fees to interested individuals and organisations for these datasets.
- Support and services: the provider organisation offers data availability paired with packages and licences that offer extended services.

- Increasing quality through participation: an organisation relies on the contribution of third parties to the maintenance of their open data, thus increasing the data quality.
- Cost avoidance: a business model designed to aid open access data providers in their pursuit of profitable publishing solutions by reducing the cost.

As presented above, each business model has its own characteristics and may serve different purposes and different user categories. However, there are some similar characteristics that permit to group these business models in broader categories. More specifically, there are business model types that offer an initial product free of charge and then fees are applied later for "added value" products/services (e.g. freemium, dual-licencing, etc.). In other business models, products/services are not offered free of charge, however, they are offered in high quality and complete form at some cost (e.g. premium, sponsorship, etc.). There are business models reaching out to more customers, or extend the product/service offered to existing customers via widening the sharing and use of open access data (e.g. razor blade) and open data business models that aim to reduce their costs through the collaboration with third parties (e.g. increasing quality through participation).

Based on these aspects, five broad categories of business models related to open science have been established in deliverable D 4.3 of the BE OPEN project. In order to keep the assessment as simple as possible, the ethical aspects are explored for these five broad categories in the following:

- Freemium (freemium, dual-licensing, charging for changes, open source, free as branded-advertising).
- Premium (premium, sponsorship, support and services, demand-oriented platform, supply-oriented platform, white-label development).
- Cost-saving (increasing quality through participation, cost avoidance).
- Indirect Benefit (support primary business).
- Razor-Blade (infrastructural razor and blades).

Ethical aspects of business models

Despite the different characteristics of the business models presented above, there is a common goal, which concerns the earning of added value and maintenance of their viability. For this purpose, in addition to management, financial and strategic planning issues, legal issues that may arise from the nature of both the data and the business model are taken into account and handled appropriately. Such legal issues may be related to the protection of personal data, the protection of copyright and proprietary data or IPR in general, software or services. Given that a relevant legal framework is in most cases in place, special attention is given by the publishers/intermediaries/users of open data and services to ensure their compliance with it.

However, beyond the legal issues, there are also issues of ethical value without necessarily having legal status, which may arise from the application of various types of business models related to Open Science. These ethical issues are likely to be overlooked in the face of the goal of developing and implementing a sustainable and profitable business model.

Within this context, an ethical issue that may arise concerns the principle of equal opportunity for both access to open data and their use for research purposes, as well as the publication of open data and results. Thus, business models that apply fees either for the acquisition of data or services from the

beginning (e.g. premium) or, in the case of the additional request for complementary or higher quality datasets, products or services (e.g. freemium, razor-blade), raise the issue of equal opportunity, especially for researchers and users with limited funds for these purposes. This issue may also endanger the academic freedom, even in the case of business models for open access adopted by publishers or funders, if researchers and other relevant actors still meet barriers to access or publish research results.

In addition, the application of business models requiring fees for the publication of data or services, without ensuring a rigorous system of quality control, may raise issues related to ethics or good research practices. For example, if an increasing number of researchers prefer to pay in order to publish their findings in open access journals which lack quality control, this will result not only in misuse of research funds for self-promotion, but also to an increasing number of fabricated results in the scientific literature and the appearance of misleading scientific claims. Similar consequences of misleading the research community may arise, if specific sponsors intervene in the publication of datasets or other products aiming to gain profit, without the existence of a system for quality control.

As already referred, there are also business models, providing more than one license-type for the same product/service, differentiated by certain conditions (e.g. dual-licensing). The application of such models requires a transparent system ensuring that providers are not illegitimately compensated more than once for the same product or service (a practice mostly known as "double dipping"). This also applies to publishers of scientific results or hybrid journals, who may collect article processing charges in addition to the subscription payments, exploiting thus the publishing system in order to gain extra profit.

Another ethical issue that may arise is that of the commercialisation or misuse of openly shared products or services. In case of open source, for instance, the source code provided can be accessed, edited or distributed by anyone. This bears the risk of either misuse or loss of quality of the product, if both the users and providers are not capable of taking appropriate measures. Additionally, the risk of commercialisation of such open-source codes lurks, in the case of mergers or acquisitions, with copyrights, patents or trademarks being acquired as well.

Finally, an ethical issue that was referred in the introduction is that of dual use. An example of the risk originating in dual use of public transport data is provided in BE OPEN deliverable D 4.1, indicating that while the data/ information on the number of passengers of public transportation during peak-times can be beneficial for transport research and may lead to knowledge, products or technologies, it can also be used with ill intent e.g. by terrorist planning attacks on soft targets. This is an ethical issue that may be faced in Open Science regardless of the business model type. However, it is stressed that businesses or organisations releasing their own data in order to support their primary goals (e.g. supporting primary business model) have to take this aspect into account.

In Table 9 below, the broad categories of the business models are presented along with the main characteristics of each category, as well as the potential ethical issues that may arise. It is noted however, that some of the ethical issues recorded will not necessarily arise from the business models themselves, but rather due to the lack of some critical parameters and research principles of Open Science, such as transparency, honesty, quality control mechanisms etc.

Table 9 Ethical Aspects and main Characteristics by Business Model Category

Category	Business Models	Main characteristics ²⁸	Ethical Aspects
Freemium	Freemium; Dual-Licensing; Charging for Changes; Open Source; Free as Branded-Advertising	Limited data/services are offered free of charge and fees are applied for additional request for complete and higher quality datasets/services.	principal of equal opportunity; "double dipping"; commercialisation
Premium	Premium; Sponsorship; Support and Services; Demand-Oriented Platform; Supply-Oriented Platform; White-Label Development	Data/services are not offered free of charge, however, data/services are offered in high quality and complete form at some cost.	principal of equal opportunity; misuse of funds for self-promotion, misleading scientific community
Cost-saving	Increasing Quality through Participation; Cost Avoidance	Models in this category do not entirely cover the cost, but reduce cost of opening and releasing data by engaging data users and re-user participants.	unintended secondary uses and misappropriation
Indirect Benefit	Support Primary Business	Business develop its own data and data infrastructure by using the third-party infrastructures in order to support its primary goals.	dual use
Razor-Blade	Infrastructural Razor and Blades	A first set of data/services is offered at a discount, while complementary or dependent data/services are offered at a considerable higher price.	principal of equal opportunity

2.3.2.3 Guidelines to mitigate Ethical Concerns

As stated above, ethical concerns connected to legal aspects can easily be avoided by obeying the law. However, as far as the non-legal ethical aspects are concerned, ethical concerns can be mitigated by establishing the good research practices related to Open Science in transport based on ALLEA good research practices and following the EOSC Rules of Participation. The fundamental research principles entailed therein will be used as mitigation actions that will potentially solve the five ethical concerns presented above which have also been analysed in light of the various business models. In Table 10, each ethical aspect is presented together with their respective negative impacts from the above list. For each negative impact and ethical aspect a set of mitigating actions are proposed in the last column. Each proposed mitigating action is based on the proposed fundamental research principles from section 2.3.1.3.

²⁸ Zeleti, Fatemeh Ahmadi, Ojo, Adegboyega, Curry, Edward (2014) Emerging business models for the open data industry: Characterization and analysis, doi: 10.1145/2612733.2612745.

Table 10: Mitigation Guidelines proposed per Ethical Aspect Context

Ethical Aspect	Negative Impact	Good Research Practices context	Mitigation Actions
Unintended secondary use and misappropriation (misinterpretation of data)	Practical aspects of misinterpretation may arise when data is further processed in “out of context” topics/fields and used for purposes for which the initial authors and involved researchers have not agreed upon.	<ul style="list-style-type: none"> Research Environment Training, Supervision and Mentoring Research Procedures Safeguards Data Practices and Management Collaborative Working Publication and Dissemination 	<ul style="list-style-type: none"> Research institutions and organisations promote Open Science and ensure a culture of research integrity. Research institutions and organisations provide clear policies and procedures on research principles related to Open Science. Research institutions and organisations provide proper infrastructure for the implementation of all Open Science related procedures. All researchers undertake training in ethics and research integrity when sharing or reusing data and research materials. Researchers publish research results in an open and honest manner, respecting confidentiality of data or findings, when required. Researchers report their results in a way that is compatible with the standards of the Open Science framework (at European level), so that they can be verified and reproduced. Researchers conduct research and handle research subjects in accordance with legal and ethical provisions. Open Science protocols take account of relevant differences in age, gender, culture, religion, ethnic origin and social class. Researchers, research institutions and organisations ensure access to data is as open as possible, as closed as necessary, and where appropriate in line with the FAIR Principles. Researchers, research institutions and organisations provide transparency about how to access or make use of open data and research materials. Researchers, research institutions and organisations acknowledge data as legitimate and citable products of research. All partners in research collaborations agree on the process for communicating their research in an open manner. All authors are honest when communicating openly their research to the general public.
	Unintended secondary use of data when sensible data is involved can ultimately lead to stigmatisation, discrimination and other physical damage to individual's health and wellbeing.		
Dual use	Unintended secondary use of data can harm the reputation of an individual researcher or even the entire associated institution.	<ul style="list-style-type: none"> Research Environment Training, Supervision and Mentoring Research Procedures Safeguards Data Practices and Management Collaborative Working Publication and Dissemination 	<ul style="list-style-type: none"> Research institutions and organisations promote Open Science and ensure a culture of research integrity. Research institutions and organisations provide clear policies and procedures on research principles related to Open Science. Research institutions and organisations provide proper infrastructure for the implementation of all Open Science related procedures. All researchers undertake training in ethics and research integrity when sharing or reusing data and research materials. Researchers publish research results in an open and honest manner, respecting confidentiality of data or findings, when required. Researchers report their results in a way that is compatible with the standards of the Open Science framework (at European level), so that they can be verified and reproduced. Researchers conduct research and handle research subjects in accordance with legal and ethical provisions. Open Science protocols take account of relevant differences in age, gender, culture, religion, ethnic origin and social class. Researchers, research institutions and organisations ensure access to data is as open as possible, as closed as necessary, and where appropriate in line with the FAIR Principles. Researchers, research institutions and organisations provide transparency about how to access or make use of open data and research materials. Researchers, research institutions and organisations acknowledge data as legitimate and citable products of research. All partners in research collaborations agree on the process for communicating their research in an open manner. All authors are honest when communicating openly their research to the general public.
	Misappropriation and ill intent secondary use of research data can lead to discrimination for an individual researcher or even the entire associated institution and even lead to a significant crisis.		
Unequal distribution of research results	All involved research parties (institutions and individual researchers) gain unequal benefits/rewards.	<ul style="list-style-type: none"> Research Environment Training, Supervision and Mentoring Research Procedures Safeguards Data Practices and Management Collaborative Working Publication and Dissemination 	<ul style="list-style-type: none"> Research institutions and organisations provide clear policies and procedures on research principles related to Open Science. Research institutions and organisations provide proper infrastructure for the implementation of all open science related procedures. All researchers undertake training in ethics and research integrity when sharing or reusing data and research materials Researchers report their results in a way that is compatible with the standards of the Open Science framework (at European level), so that they can be verified and reproduced. Researchers conduct research and handle research subjects in accordance with legal and ethical provisions.

Ethical Aspect	Negative Impact	Good Research Practices context	Mitigation Actions
			<ul style="list-style-type: none"> Open Science protocols take account of relevant differences in age, gender, culture, religion, ethnic origin and social class. Researchers, research institutions and organisations ensure access to data is as open as possible, as closed as necessary, and where appropriate in line with the FAIR Principles. Researchers, research institutions and organisations provide transparency about how to access or make use of open data and research materials. All partners in research collaborations agree on the process for communicating their research in an open manner. All authors are honest when communicating openly their research to the general public. The same criteria of publication (acknowledgments, citations, conflicts of interest etc.) should applied for subscription journals, open access journals or in any other alternative publication form.
	Less developed countries or institutions lacking technical capabilities cannot access publicly open transport research data.	<ul style="list-style-type: none"> Research Environment Safeguards Data Practices and Management Collaborative Working Publication and Dissemination Reviewing, Evaluating and Editing 	<ul style="list-style-type: none"> Research institutions and organisations provide proper infrastructure for the implementation of all Open Science related procedures. Open Science protocols take account of relevant differences in age, gender, culture, religion, ethnic origin and social class. Researchers, research institutions and organisations provide transparency about how to access or make use of open data and research materials. All partners in research collaborations agree on the process for communicating their research in an open manner. All authors are honest when communicating openly their research to the general public. Open peer review and evaluation of submissions for publication, funding, appointment, promotion or reward should be conducted in a transparent and justifiable manner.
	Discourage research groups or individuals with limited technical capacities to use available transport research data.	<ul style="list-style-type: none"> Research Environment Collaborative Working Publication and Dissemination 	<ul style="list-style-type: none"> Research institutions and organisations provide proper infrastructure for the implementation of all open science related procedures. All partners in research collaborations agree on the process for communicating their research in an open manner. All authors are honest when communicating openly their research to the general public.
Commercialisation	Steered or biased research interests/focus areas by private companies that affect public research institutions (i.e. universities).	<ul style="list-style-type: none"> Research Environment Training, Supervision and Mentoring Safeguards Data Practices and Management Publication and Dissemination Reviewing, Evaluating and Editing 	<ul style="list-style-type: none"> Research institutions and organisations promote Open Science and ensure a culture of research integrity. Research institutions and organisations provide clear policies and procedures on research principles related to Open Science. Research institutions and organisations ensure that researchers receive proper training in implementing science in an open manner. All researchers undertake training in ethics and research integrity when sharing or reusing data and research materials. Researchers conduct research and handle research subjects in accordance with legal and ethical provisions. Open Science protocols take account of relevant differences in age, gender, culture, religion, ethnic origin and social class. Researchers, research institutions and organisations ensure access to data is as open as possible, as closed as necessary, and where appropriate in line with the FAIR Principles. The same criteria of publication (acknowledgments, citations, conflicts of interest etc.) should applied for subscription journals, open access journals or in any other alternative publication form. Open peer review and evaluation of submissions for publication, funding, appointment, promotion or reward should be conducted in a transparent and justifiable manner.
	Dependence of research entities to private sector due to funding schemes	<ul style="list-style-type: none"> Data Practices and Management Publication and Dissemination Reviewing, Evaluating and Editing 	<ul style="list-style-type: none"> Researchers, research institutions and organisations ensure access to data is as open as possible, as closed as necessary, and where appropriate in line with the FAIR Principles. The same criteria of publication (acknowledgments, citations, conflicts of interest etc.) should applied for subscription journals,

Ethical Aspect	Negative Impact	Good Research Practices context	Mitigation Actions
			<p>open access journals or in any other alternative publication form.</p> <ul style="list-style-type: none"> Open peer review and evaluation of submissions for publication, funding, appointment, promotion or reward should be conducted in a transparent and justifiable manner.
	Industrialization of universities' research outcomes (i.e. start-ups)	<ul style="list-style-type: none"> Research Environment Research Procedures Safeguards Data Practices and Management Publication and Dissemination Reviewing, Evaluating and Editing 	<ul style="list-style-type: none"> Research institutions and organisations provide proper infrastructure for the implementation of all Open Science related procedures. Researchers report their results in a way that is compatible with the standards of the Open Science framework (at European level), so that they can be verified and reproduced. Researchers conduct research and handle research subjects in accordance with legal and ethical provisions. Researchers, research institutions and organisations ensure access to data is as open as possible, as closed as necessary, and where appropriate in line with the FAIR Principles. Researchers, research institutions and organisations provide transparency about how to access or make use of open data and research materials. Researchers, research institutions and organisations acknowledge data as legitimate and citable products of research. The same criteria of publication (acknowledgments, citations, conflicts of interest etc.) should applied for subscription journals, open access journals or in any other alternative publication form. Open peer review and evaluation of submissions for publication, funding, appointment, promotion or reward should be conducted in a transparent and justifiable manner.
	Secondary use of research data from public research institution by a private company and unequal monetary benefits from research data produced	<ul style="list-style-type: none"> Research Environment Training, Supervision and Mentoring Research Procedures Safeguards Data Practices and Management Publication and Dissemination Reviewing, Evaluating and Editing 	<ul style="list-style-type: none"> Research institutions and organisations provide clear policies and procedures on research principles related to Open Science. Research institutions and organisations ensure that researchers receive proper training in implementing science in an open manner. Researchers report their results in a way that is compatible with the standards of the Open Science framework (at European level), so that they can be verified and reproduced. Researchers conduct research and handle research subjects in accordance with legal and ethical provisions. Researchers, research institutions and organisations ensure access to data is as open as possible, as closed as necessary, and where appropriate in line with the FAIR Principles. Researchers, research institutions and organisations provide transparency about how to access or make use of open data and research materials. The same criteria of publication (acknowledgments, citations, conflicts of interest etc.) should applied for subscription journals, open access journals or in any other alternative publication form. Open peer review and evaluation of submissions for publication, funding, appointment, promotion or reward should be conducted in a transparent and justifiable manner.
Restriction of scientific freedom	Lead science to certain monetary valuable direction	<ul style="list-style-type: none"> Training, Supervision and Mentoring Safeguards Data Practices and Management Publication and Dissemination Reviewing, Evaluating and Editing 	<ul style="list-style-type: none"> All researchers undertake training in ethics and research integrity when sharing or reusing data and research materials. Researchers conduct research and handle research subjects in accordance with legal and ethical provisions. Researchers, research institutions and organisations ensure access to data is as open as possible, as closed as necessary, and where appropriate in line with the FAIR Principles. Researchers, research institutions and organisations provide transparency about how to access or make use of open data and research materials. The same criteria of publication (acknowledgments, citations, conflicts of interest etc.) should applied for subscription journals, open access journals or in any other alternative publication form.

Ethical Aspect	Negative Impact	Good Research Practices context	Mitigation Actions
			<ul style="list-style-type: none"> Open peer review and evaluation of submissions for publication, funding, appointment, promotion or reward should be conducted in a transparent and justifiable manner.
	Restriction of available state-of-the-art IT and research tools	<ul style="list-style-type: none"> Research Environment Training, Supervision and Mentoring Research Procedures Data Practices and Management Collaborative Working Publication and Dissemination 	<ul style="list-style-type: none"> Research institutions and organisations promote Open Science and ensure a culture of research integrity. Research institutions and organisations provide clear policies and procedures on research principles related to Open Science. Research institutions and organisations ensure that researchers receive proper training in implementing science in an open manner. Researchers report their results in a way that is compatible with the standards of the Open Science framework (at European level), so that they can be verified and reproduced. Researchers, research institutions and organisations ensure access to data is as open as possible, as closed as necessary, and where appropriate in line with the FAIR Principles. Researchers, research institutions and organisations acknowledge data as legitimate and citable products of research. All partners in research collaborations agree on the process for communicating their research in an open manner. All authors are honest when communicating openly their research to the general public.

2.3.2.4 Conclusion on Ethical Principles and Business Models

Since the assessment above has clearly shown that ethical risks can be essentially mitigated by both compliance with the laws and by committing to the fundamental research principles, these ethical aspects will not be treated within a separate chapter of the code of conduct in ANNEX 1. Instead, they will rather be covered together with the fundamental research principles section, as far as non-legal ethical aspects are concerned. Where legal ethical aspects are concerned, this will be covered by the legal compliance principles section.

2.3.3 Legal Compliance Principles

To fulfil their individual purposes in the field of Open Science in transport, the identified main stakeholders for the “European Code of Conduct on Open Science in Transport” (Section 2.1) rely on using data on a large scale. The access to and further use of this data may be restricted due to the qualification as personal data and/or applicable e-privacy laws or subject to intellectual property rights. In turns, this may also lead to particular security or secrecy aspects.

The legal and fundamental aspects for Open Science in transport have been closely analysed in BE OPEN deliverable D 4.1.²⁹ These aspects have been determined as fundamental building blocks for creating trust among stakeholders. Legally, the basis for this trust can mainly be found in data protection and security of the data because clear data protection rules serve as encouragement for stakeholders to be active in the field of Open Science.

This applies to all data qualifying as sensitive data, mainly consisting of two broad categories:

²⁹ BE OPEN deliverable D 4.1, “Open Science in transport research: legal issues and fundamental principles”.

- **Personal data:** all personal data is considered sensitive data. Within the scope of personal data there is, however, room for further distinguishing categories of personal data by means of their sensitivity. Notwithstanding this further distinction, all personal data remains sensitive data.
- **Proprietary data:** proprietary data is considered sensitive because unintentional revealing of the data can potentially harm an individual, a company or an organisation, both in terms of non-material or material detriments.

The code of conduct serves to document a consensus between the involved stakeholders, allowing the balancing of interests between utmost openness in Open Science and the protection of data and individuals. Based on the important legal aspects derived from EU directives, EU regulations and CJEU judgements outlined in deliverable D 4.1, these essential legal aspects are briefly summarised in the following.

2.3.3.1 *The legal Protection of Data through Intellectual Property Rights*

Based on the analysis of the key outcomes presented in other BE OPEN deliverables, the concept of data ownership materialises as a significant issue in the debate regarding data sharing. Whereas data ownership does not yet exist as a legal concept in the EU Member States, legal protection of data, if only to a limited extent, is indeed afforded by intellectual property rights deriving from copyright, licensing, trade secrets and database rights. For Open Science in transport, in particular, legal frameworks providing protection to databases are of relevance. Although databases are only eligible to legal protection under rather narrow prerequisites, and in particular, database-rights are materially not able to exceed to the protection immanent to the content of the database as such, the existing regulatory framework may pose a (legal) barrier for Open Science in transport. Furthermore, the European legislator has recognised the need for stakeholders to access data on a broad scale, e.g. for research purposes and has therefore introduced exemptions that may facilitate Open Science in transport among various areas and in numerous constellations. As a result, not only existing (legal) limitations but also the potential offered by the European legal framework facilitating the Digital Single Market³⁰ are of outstanding importance.

Consequently, the “European Code of Conduct on Open Science in Transport” cannot serve to inform about all applicable intellectual property rights cross various EU jurisdictions, industries and examples of application. However, it aims to raise awareness of the fact that intellectual property rights may exist and always need to be observed and respected. This in turn, is an essential groundwork to promote the expansion of Open Science in transport.

2.3.3.2 *Privacy and Data Protection*

The BE OPEN surveys conducted in various deliverables showed that privacy aspects and especially the GDPR rank top in terms of legal issues for Open Science in transport research. Primarily, this is likely the effect of privacy aspects becoming more prominent in the open public. This in turns is most likely

³⁰ See: EU Commission, Shaping Europe’s digital future, <https://ec.europa.eu/digital-single-market/en>, last accessed 12 May 2021.

a consequence of the drastic GDPR fines of up to EUR 20,000,000 or 4% of a company's total annual worldwide turnover for violations.

Avoiding the processing of personal data has become significantly difficult, since in a digitalised world, stakeholders are necessarily required to rely on electronic data processing to fulfil their tasks. In turn, this processed data will more than often at least contain some sort of a reference to a natural person. Hence, due to the broad definition of personal data in the GDPR, processing activities of stakeholders will include information relating to an identified or identifiable natural person and as such fall under the regime of the GDPR.

Here, the “European Code of Conduct on Open Science in Transport” serves to preserve and safeguard the right to self-determination over personal data. This right is safeguarded and guaranteed in the (constitutional) laws of every EU Member States and can also be internationally derived from Article 8 of the Charter of Fundamental Rights of the European Union.³¹

Essentially, this shows that it is of utmost importance that stakeholders are able to identify the statutory obligations resulting from the processing of personal data. This again requires a basic understanding about the key aspects of GDPR application, consisting of the territorial scope as well as the material scope, which largely leads to determining when an individual is identifiable. As such, the code of conduct is not aimed at repeating statutory obligations, but rather serve as a first step to raise awareness and understanding for the existence of these obligations. In a second step, the code of conduct shall then ask stakeholders for a commitment towards the essential GDPR obligations and basic data protection principles. Materially, these include but are not limited to the following aspects.

Basic GDPR principles of data protection

The “European Code of Conduct on Open Science in Transport” shall entail a declaration towards obeying the lawfulness, fairness and transparency as well as purpose limitation, data minimisation, accuracy, storage limitation, integrity and confidentiality as basic data protection principles.

Figure 10 illustrates these basic data protection principles and emphasises the additional requirement for proper documentation (accountability).

³¹ See: Charter of Fundamental Rights of the European Union, 2012/C 326/02.

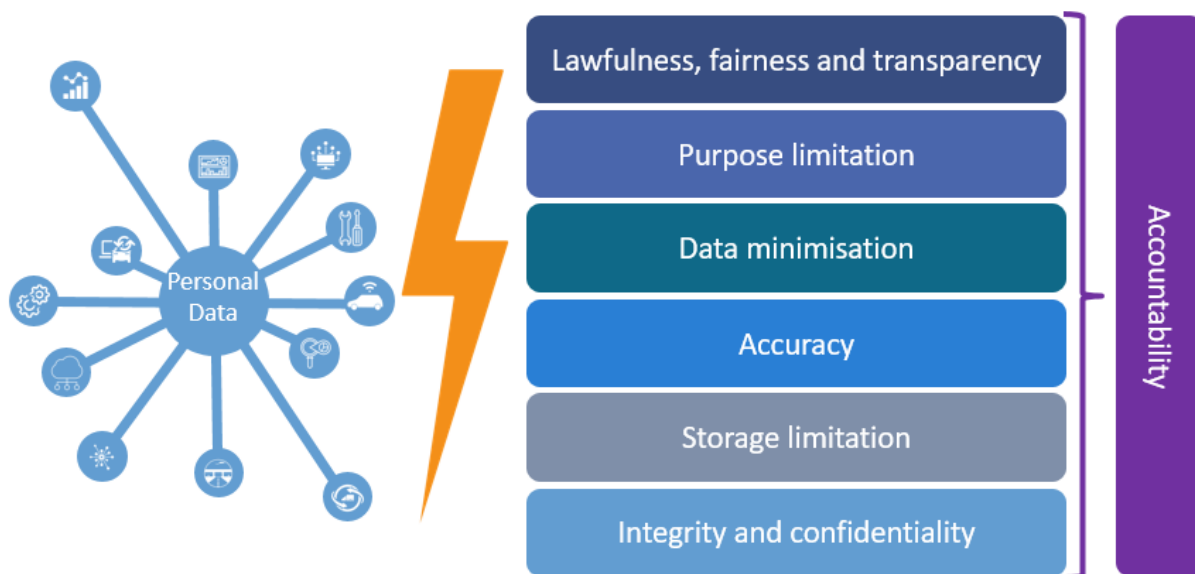


Figure 10 GDPR essential Data Processing Principles

Legal basis and changes of purposes for processing (including research privilege)

The code of conduct shall hold an obligation to carefully assessing on the correct legal basis for each processing activity and implementing safeguards for changing purposes of the data processing. These changing purposes are of particular importance where scientific privilege applies. Figure 11 holds an overview of the statutory legal bases³²; particularly relevant legal bases for Open Science in transport are highlighted in green.

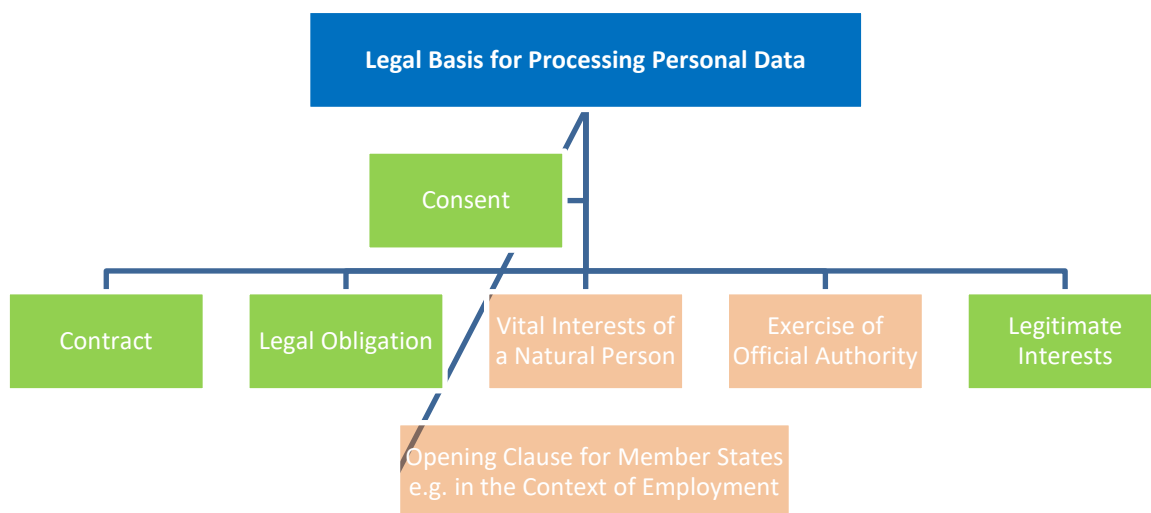


Figure 11 Overview on legal Bases for processing Personal Data

³² See Art 6 Para 1 GDPR for further reference.

The aforementioned research privilege, which is based on GDPR opening clauses for EU Member States, is closely connected to and limited by scientific purposes as well as the status as researcher and the compliance with scientific working methods. Table 11 illustrates the GDPR prerequisites, which at the same time form the demarcation-line for any EU Member State laws making use of the opening clause and thus creating a research privilege.

Table 11 Overview on Privilege for scientific Purposes under the GDPR

Definition of scientific Purposes	Addressee	Opening Clauses
<p>No definition in the GDPR</p> <ul style="list-style-type: none"> • Rec 159 GDPR: Scientific research purposes • To be interpreted broadly, incl. <ul style="list-style-type: none"> ○ technological development ○ demonstration ○ fundamental research ○ applied research ○ privately funded research <p>Scientific Research is commonly understood as:</p> <p><i>Independent and autonomous intellectual activity with the aim of acquiring new knowledge in a methodical, systematic and verifiable manner.</i></p>	<p>Anyone who</p> <ul style="list-style-type: none"> • independently researches • according to scientific methods • for the purpose of acquiring knowledge 	<p>Allow national exceptions, e.g.</p> <ul style="list-style-type: none"> • Art 85 Para 2 GDPR (comprehensive exceptions for academic expression) • Art 89 Para 2 GDPR (data subjects rights) • Art 5 Para 1 lit b, e GDPR (purpose and storage limitation) • Art. 9 Para 2 lit j GDPR (special categories of data) • Art 14 Para 5 lit b GDPR (Information) • Art 21 Para 6 GDPR (right to object)

Technical and organisational safety measures as well as data privacy compliance aspects

The “European Code of Conduct on Open Science in Transport” shall hold baseline controls for appropriate technical and organisational security measures for all data. Where personal data is involved, technical and organisational safety measures must specifically provide for transparent and accurate information, securing the mandatory contractual privacy structures, safeguarding proper handling of (potential) data breach incidents, data protection impact assessments, maintaining proper records of processing and fulfilling data subject requests.

The GDPR follows a risk-based approach of adopting mandatory technical and organisational measures without explicitly mentioning a full set of requirements. On the technical side, the GDPR requires implementing privacy-by-design and privacy-by-default measures. On the organisational side, the GDPR mainly requires the implementation of effective organisational procedures for providing transparent and accurate information, securing the mandatory contractual privacy structures, safeguarding proper handling of (potential) data breach incidents, data protection impact assessments, maintaining proper records of processing and fulfilling data subject requests.

In essence, the required level of technical and organisational safety measures gets higher with the rising risk of a processing activity for the rights and freedoms of natural persons.

Safeguarding international data transfers

Given the international context of Open Science in transport, which is not bound by the borders of the EU, the “European Code of Conduct on Open Science in Transport” shall also raise awareness towards providing adequate safety-measures for the transfer of personal data to a third country outside the EU.

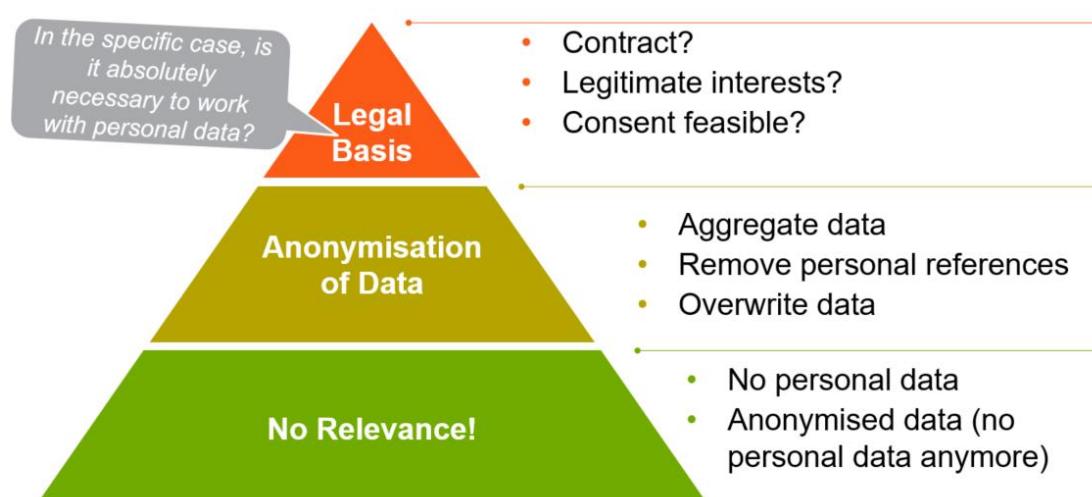
To the extent that Open Science requires the processing of personal data within the scope of the GDPR, there are significant legal obligations that need to be followed. The GDPR is based on the idea that within the EU and EEA, the harmonisation of the privacy laws through the GDPR leads to an equal level of protection. As soon as personal data leaves this safe region, additional mandatory safeguards apply. Pursuant to Chapter 5 GDPR, the most essential safeguards for data transfer are:

- EU Commission adequacy decisions based on Art 45 GDPR,
- EU Commission approved Standard Contractual Clauses (“SCC”) based on Art 46 GDPR.

In regards to these SCC, the CJEU³³ has established additional burdens ruling that though SCC generally remain a valid mechanism to transfer personal data outside of the EU, they require an individual positive risk assessment to be rendered by the data exporter. On a case-by-case basis, the data exporter must furthermore consider, whether the data importer located out-side of the EU is capable of complying with its obligations derived from the SCC. Additional safeguards must be taken where that is at risk or even in doubt.

Phased approach for avoiding GDPR compliance-issues

In essence, the “European Code of Conduct on Open Science in Transport” shall raise awareness and provide an information basis for stakeholders to identify the material and territorial application of the GDPR in order to enable them to comply with mandatory obligations. On this basis, the code of conduct holds a phased approach of avoiding the processing of personal data, inter alia, by means of data-anonymisation. This approach is illustrated in Figure 12.



³³ CJEU judgement of 16 July 2020 in case C-311/19 – “Schrems II”.

Figure 12 Overview on phased Approach to handle Personal Data

2.3.3.3 E-Privacy aspects

The legal privacy framework governing the processing of data is complemented by the e-Privacy Directive. In contrast to the GDPR, the scope of the e-Privacy Directive is considerably broader and does not only apply to personal data, but rather to all information regardless of the nature. Although the code of conduct is not aimed to focus on e-Privacy aspects in detail, it does however intend to create awareness of processing activities that may fall in the scope of the e-Privacy Directive and subsequently will provide guidance on which requirements the e-Privacy Directive may impose on stakeholders with regard to certain processing activities. This is particularly important for processing activities that may be deemed as marketing-communication, which potentially affects dissemination strategies of various Open Science stakeholders.

2.3.3.4 Security Aspects

Based on security concerns determined in other BE OPEN deliverables it can be concluded that the main security issues are again closely connected to data protection and privacy law. Furthermore, there are additional EU laws that specifically target the transport sector and as such can become relevant for the stakeholders of the code of conduct, such as the NIS Directive³⁴.

Figure 13 illustrates the main aspects of security measures. They can be required by law and must be tailored to the specific risks as well as to the individual cost-compliance structure.

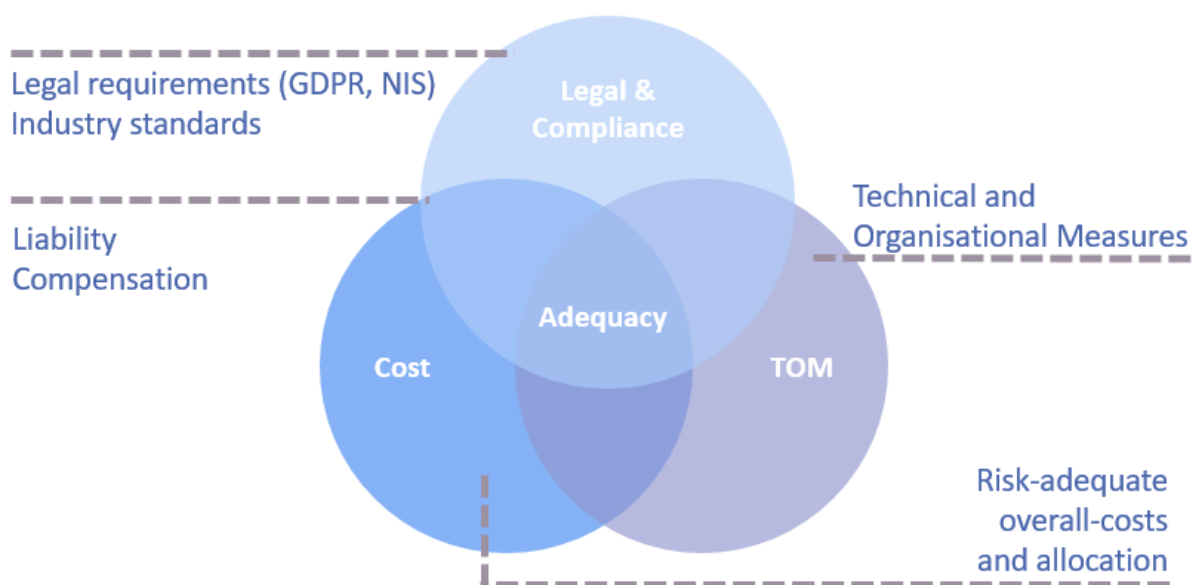


Figure 13 Overview on adequate Implementation of Security Aspects

In conclusion, the main legal security aspects based on EU Member State laws or EU regulations generally require:

³⁴ Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union.

- a risk based approach of regularly assessing associated risks,
- procedures of regularly checking if technical and organisational risk-mitigating measures not only fulfil the broad description of a legal requirement but rather remain state-of-the-art,
- establish and maintain training and reporting procedures for identifying risks and assessing on mitigating actions,
- establish and maintain procedures to sufficiently handle breach-related obligations i.e. based on the GDPR and EU Member State laws transposing the NIS Directive, and
- consulting experts and regularly assess the available of current industry-standards for security measures.

2.3.4 Sanctions

During the process of working on this deliverable D 4.4, the involved BE OPEN beneficiaries assessed upon the questions of adding sanctions to the initial version of the “European Code of Conduct on Open Science in Transport” or not. In theory, sanctions are a common method of achieving and enforcing compliance with certain rules of conduct. The purposes of sanctions are subject to controversial legal, philosophical and ethical discussions. Amongst others, as the German criminal law exemplary entails, sanctions have a general preventive function. They serve to ensure that rules are enforced to protect (legal) interests and unfolding consequences for those who disregard the prohibitions and requirements. As such, the threat of a sanction is not only intended to create the conditions for imposing sanctions as a penalty, but at the same time contains an appeal to the general public not to act against the established rules.³⁵

Moving away from these theoretical aspects, the BE OPEN beneficiaries concluded that sanctions in the “European Code of Conduct on Open Science in Transport” are only worth having, if they are effective. Further, in order to be effective, the BE OPEN project would need to establish mechanisms to enforce breaches of the code of conduct. This however would require resources, which as first step should better be used to work towards establishing the code of conduct as living document (Section 2.2). In addition, implementing sanctions in the initial version of the “European Code of Conduct on Open Science in Transport” bears the risk of discouraging stakeholders from promoting the code of conduct. Hence, this in turn would contradict the BE OPEN object of reaching as a broad base of stakeholders (Section 2.1).

Notwithstanding, sanctions are a viable method of safeguarding and supporting the code of conduct and are as such explicitly reserved for further amendments of the Code of Conduct as living document. Additionally, institutions, groups of stakeholders and operators of platforms may impose individual consequences for material breaches of the Code of Conduct. From the perspective of the BE OPEN project, this is a favourable procedure since it allows the SC (and later EWCOSET) to productively focus on the material enhancement of the “European Code of Conduct on Open Science in Transport” as living document.

³⁵ Kinzig in Schoenke/Schroeder Strafgesetzbuch, vorb. §§ 38 et. Seq.

3 Conclusions

Transport data is undoubtedly a valuable asset of the European research and innovation ecosystem. The “European Code of Conduct on Open Science in Transport” will proliferate sharing of data which in turn will increase improved safety and environmental impact in line with measures pushing for sustainable solutions and qualitative living, such as UN SDGs³⁶ or the Prince of Wales ‘Terra Carta’³⁷ in Europe. Furthermore, it serves as an important stepping-stone towards reaching the overarching vision of the BE OPEN project, which is creating a common understanding about the practical impact of Open Science, as well as identifying and putting in place the mechanisms to make it a reality in transport research.

In particular, following Open Science principles urges for democratisation of information gathering and analysis in the areas where transport data are located. Thus, it is crucial for BE OPEN to provide the pathway:

- for new transport research to be reproducible³⁸,
- for infrastructures and services for transport to be developed in a way that is FAIR-enabling,³⁹
- for transport data to be processed and analysed according to methods and techniques that safeguard sensitive and/or personal information, such as anonymisation, allowing for different levels of open sharing in the philosophy of “as open as possible as closed as necessary”⁴⁰, and
- for stakeholders to be competent in Open Science⁴¹.

The material code of conduct acts as a policy framework between the identified key Open Science stakeholders in the transport sector and sets out basic ground rules and a common understanding on essential aspects of fundamental research principles, ethical principles and legal compliance principles. By doing so, the ideas and ideal of Open Science are promoted on basis of mutual trust in the quality of the data, the integrity and fairness of all committed stakeholders as well as crowing confidence about the legal compliance.

Keeping the material code of conduct as brief, precise and easily understandable as possible is the key prerequisite for effective promotion and reaching a large quantity of stakeholders. In order to reach this objective, the material “European Code of Conduct on Open Science in Transport” is separated from the main body of the BE OPEN deliverable and forms an individual document. Furthermore, the code of conduct shall be a living document subject to ongoing amendments carried out by an expert

³⁶ See United Nations Sustainable Development Goals, [https://undp.org/content/undp/en/home/sustainable-development-goals.html#:~:text=The%20Sustainable%20Development%20Goals%20\(SDGs,peace%20and%20prosperity%20by%202030](https://undp.org/content/undp/en/home/sustainable-development-goals.html#:~:text=The%20Sustainable%20Development%20Goals%20(SDGs,peace%20and%20prosperity%20by%202030), last accessed 12 May 2021.

³⁷ See Prince of Wales Terra Carta, <https://sustainable-markets.org/terra-carta>, last accessed 12 May 2021.

³⁸ See <https://intend-project.eu/wp-content/uploads/2018/05/intend-d-2.1-transport-projects-future-technologies-synopses-handbook.pdf>, last accessed 12 May 2021.

³⁹ See https://ec.europa.eu/info/sites/info/files/turning_fair_into_reality_1.pdf, last accessed 26 March 2021.

⁴⁰ See https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-data-management/data-management_en.htm, last accessed 12 May 2021.

⁴¹ See <https://op.europa.eu/en/publication-detail/-/publication/af7f7807-6ce1-11eb-aeb5-01aa75ed71a1/language-en/format-PDF/source-190694287>, last accessed 12 May 2021.



group initially consisting of the BE OPEN SC and later by the EWCOSSET. These procedures not only safeguard the status as a living document, but shall also create the basis for stakeholders to trust and rely on the code of conduct while EU and EU Member State laws change, technology evolves and/or further development of ethical aspects along with associated effects on the fundamental research principles take place in the course of time.

ANNEX 1 European Code of Conduct on Open Science in Transport

The first version of the “European Code of Conduct on Open Science in Transport” can be found in this Annex.

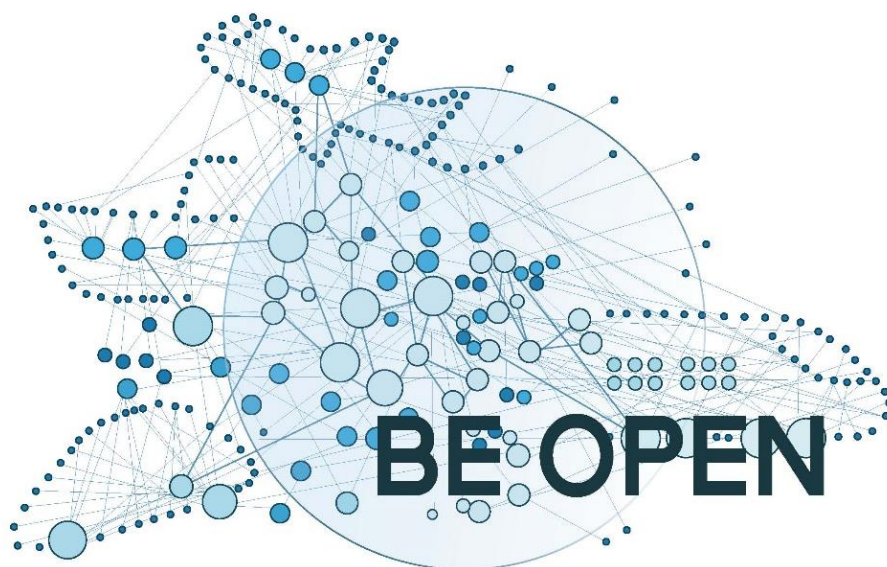
The separation of the material aspects of the code of conduct from the main body of the deliverable promotes the purpose of the code of conduct as a living document, which is independent of the BE OPEN deliverable D 4.4. This initial version of the “European Code of Conduct on Open Science in Transport” is structured as follows:

- **Preamble** (Scope and Purpose)
- **Chapter 1:** Fundamental Research Principles
- **Chapter 2:** Legal Compliance Principles
- **Chapter 3:** Final Provisions
- **References**
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- **Appendix 2:** Overview on Scientific Research Privilege under the GDPR



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European forum and oBsEratory for OPEN science in transport

Project Acronym: **BE OPEN**

Project Title: **European forum and oBsEratory for OPEN science in transport**

Project Number: **824323**

Topic: **MG-4-2-2018 – Building Open Science platforms in transport research**

Type of Action: **Coordination and support action (CSA)**

ANNEX 1 to deliverable D 4.4: European Code of Conduct on Open Science in Transport

Final

European Code of Conduct on Open Science in Transport

Preamble

The “European Code of Conduct on Open Science in Transport” and the principles set forth in its Articles address all Stakeholders, consisting of researchers and students, private researchers, research institutions, organisations and universities, policy makers (on regional, national and international level), transport networks, NGOs and community organisations, commercial transport and logistics industry players as well as citizens for all their Open Science in Transport activities. Open Science in transport activities is perceived as any and every endeavour in all modes of the transportation, e.g.:

- using emerging technologies, such as IoT or AI, to increase efficiency and efficacy of mobility applications;
- developing software offering solutions of interest and applicability to the transportation sector;
- gathering, managing and/or analysing data from instruments, such as sensors, used in mobility applications and/or appliances; or
- using interdisciplinary data to create new solutions and applications in the transportation sector.

Thus, in conclusion, Open Science in transport activities strive for public access, secure management, ethical development and exploitation of research outcomes, using technologies, instruments and derived products in a wide range of disciplines dealing with mobility issues.

The adherence to the principles formulated in the Articles of this code of conduct does not release the Stakeholders from the obligation to adhere to the existing moral or legal norms or applicable laws; in particular, the statutory laws of the EU and the EU Member States remain untouched.

If an individual or organisation chooses to adhere to the principles set forth in this code of conduct, it remains the sole responsibility of each party to refrain from violating any existing moral or legal norms or laws. Each individual Stakeholder bears full and sole responsibility for her/his/its own actions independently of this code of conduct.

If Stakeholders wish to adhere to the proposed “European Code of Conduct on Open Science in Transport”, they shall incorporate a reference in their official documentation (e.g. describing the project consortium agreement or mutual research cooperation). This reference may have the following form:

“We hereby declare that we commit ourselves to the ‘European Code of Conduct on Open Science in Transport’ and its underlying principles”.

Abbreviations and Definitions

“AI”	Artificial Intelligence.
“Anonymisation”	The definition under the GDPR shall apply, meaning the process of creating anonymous information, namely information which does not relate to an identified or identifiable natural person or to Personal Data rendered anonymous in such a manner that the Data Subject is not or no longer identifiable.
“Data Breach”	The definition under the GDPR shall apply, meaning a breach of security leading to the accidental or unlawful destruction, loss, alteration, unauthorised disclosure of, or access to, Personal Data transmitted, stored or otherwise Processed.
“Processing” or any variation thereof	The definition under the GDPR shall apply, meaning any operation or set of operations which is performed on Personal Data or on sets of Personal Data, whether or not by automated means, such as collection, recording, organisation, structuring, storage, adaptation or alteration, retrieval, consultation, use, disclosure by transmission, dissemination or otherwise making available, alignment or combination, restriction, erasure or destruction.
“Data Subject”	The definition under the GDPR shall apply, meaning an identified or identifiable (living) natural person.
“e-Privacy Laws”	Shall mean all applicable EU Member State legislation based on the Privacy and Electronic Communications Directive (Directive 2002/58/EC as updated by Directive 2009/136/EC) as well as any EU legislation repealing this directive.
“EU/EEA”	European Union / European Economic Area
“FAIR Principles”	Principles to improve Findability, Accessibility, Interoperability and Reusability.
“GDPR”	Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the Processing of Personal Data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).
“IPR”	Intellectual Property Rights.
“IoT”	Internet of Things.
“NIS Directive”	Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union.
“NGO”	Non-governmental organisation.
Open Science Protocols	A set of rules and practices of acceptable behaviour in compliance with the fundamental principles of Open Science.

“Personal Data”	The definition under the GDPR shall apply, meaning any information relating to an identified or identifiable natural person. An “identifiable person” is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that person.
“Privacy Laws”	Shall mean all applicable EU and/or EU Member State legislation relating to privacy or Personal Data including but not limited to the General Data Protection Regulation (EU 2016/679) and the Privacy and Electronic Communications Directive (Directive 2002/58/EC as updated by Directive 2009/136/EC).
“Scientific Research”	Scientific Research shall be interpreted broadly and cover any independent and autonomous intellectual activity with the aim of acquiring new knowledge in a methodical, systematic and verifiable manner.
“Stakeholders”	Shall cover all researchers and students, private researchers, research institutions, organisations and universities, policy makers (on regional, national and international level), transport networks, NGOs and community organisations, commercial transport and logistics industry players and citizens for all their Open Science in Transport activities.

Chapter 1 Fundamental Research Principles

Stakeholders involved in Scientific Research activities hereby declare that they commit themselves to the fundamental research principles derived from the All European Academies (**ALLEA**) good research practices as well as the European Open Science Cloud (**EOSC**) Rules of Participation adapted in the following. For those Stakeholders not directly involved in Scientific Research activities, the essence of the fundamental research principles listed in the Articles under this Chapter shall apply analogously.

The commitment to the fundamental research principles shall particularly aim to avoid breaches of ethical principles predominantly arising from but not limited to unintended secondary use and misappropriation of research results or data in general as well as ethical risks resulting from dual use, unequal distribution of research results, commercialisation and restriction of scientific freedom.

Article 1 Research Environment

- (1) Institutional Stakeholders (especially consisting of research institutions, organisations and universities) shall promote Open Science and ensure a culture of research integrity.
- (2) Institutional Stakeholders shall provide clear policies and procedures on research principles related to Open Science.

(3) Institutional Stakeholders shall provide proper infrastructure for the implementation of all Open Science related procedures.

Article 2 Training, Supervision and Mentoring

(1) Institutional Stakeholders shall ensure that researchers receive proper training in implementing research and their results in an open manner

(2) All researchers shall undertake training in ethics and research integrity when sharing or reusing data and research materials including results.

Article 3 Research Procedures

(1) Researchers shall publish research results in an open and honest manner, respecting confidentiality of data or findings, when required.

(2) Researchers shall report their results in a way that is compatible with the standards of the Open Science framework (at European level), so that they can be verified and reproduced.

Article 4 Safeguards

(1) Researchers shall conduct research and handle research subjects in accordance with legal and ethical provisions.

(2) Open Science protocols must take account of relevant differences in age, gender, culture, religion, ethnic origin and social class.

Article 5 Data Practices and Management

(1) Stakeholders shall ensure access to data is as open as possible, as closed as necessary, and where appropriate in line with the FAIR Principles.

(2) Stakeholders shall promote transparency and provide transparent procedures about how to access or make use of open data and research materials.

(3) Stakeholders shall acknowledge data as legitimate and citable products of research.

Article 6 Collaborative Working

All Stakeholders (partners) in research collaborations agree on the process for communicating their research in an open manner.

Article 7 Publication and Dissemination

(1) All Stakeholders are honest when communicating openly their research to the general public.

(2) The same criteria of publication (acknowledgments, citations, conflicts of interest etc.) shall apply for subscription journals, open access journals or in any other alternative publication form.

Article 8 Reviewing, Evaluating and Editing

Open peer review and evaluation of submissions for publication, funding, appointment, promotion or reward shall be conducted in a transparent and justifiable manner.

Article 9 Diversity, Inclusion and Equality

(1) Stakeholders take as fundamental that diversity and inclusion shall take into account all human experience including but not limited to age, gender, culture, education, skills, life stories etc. Promoting diversity and inclusion shall allow all Stakeholders from any background to actively contribute to the enrichment of the Open Science in Transport community.

(2) Stakeholders are committed to actively and openly support and promote equality, diversity and inclusion.

(3) Stakeholders shall work towards being a diverse and inclusive community, both in terms of organisational and practical activities in the Open Science in Transport community. To this aim, Stakeholders shall:

- study and understand the causes of inequality and barriers to diversity and inclusion and define how to address them;
- extend the community to involve a broad range of Stakeholders; and
- promote equality, diversity and inclusion in all communications in order to attract all Stakeholders.

Chapter 2 Legal Compliance Principles

For all Open Science in Transport activities, the legal compliance and security shall be a core concern for all Stakeholders in order to establish and ensure mutual trust in Open Science in Transport. All activities in Open Science must be carried out in compliance with the provisions of EU and Member States laws including relevant sector-specific regulations.

Article 10 Intellectual Property Rights

(1) Stakeholders undertake to respect and protect any IPR that they become aware of in the course of their activities in the field of Open Science in Transport. As such, the Stakeholders are fully aware that IPR are valuable assets and essential resources, which can be derived from multiple sources of rights such as trademarks, patents, copyrights, data base rights, trade secrets and further related rights.

(2) Stakeholders will make every effort to foster an environment showing awareness for spotting such IPR and will to the best of their knowledge take third party IPR into due consideration in their daily work.

(3) The Stakeholders encourage each other to protect and defend their IPR and will, to the extent practicable, openly indicate their respective IPR.

(4) Where IPR apply, the Stakeholders undertake to obtain proper authorisation before using any intellectual property and shall strictly follow the terms of use whilst refusing to misuse any IPR.

(5) The Stakeholders are aware that any violation of IPR may not only harm the individual holder of a right but is rather also detrimental to the ideals and values of Open Science in Transport.

Article 11 Principles of Data Security

- (1) Stakeholders are aware that various EU Member State laws or EU regulations impose specific legal security aspects. They undertake to obtain and comply with the legal security requirements applicable for them.
- (2) Stakeholders undertake to a risk-based approach of regularly assessing associated risks and will apply and maintain procedures of regularly checking if technical and organisational risk-mitigating measures not only fulfil the broad description of a legal requirement but also rather remain state-of-the-art.
- (3) Stakeholders shall establish and maintain training and reporting procedures for identifying risks and assessing on mitigating actions.
- (4) Stakeholders shall establish and maintain procedures enabling them to sufficiently handle breach-related obligations i.e. based on a GDPR Data Breach and EU Member State laws transposing the NIS Directive.
- (5) Stakeholders shall, where necessary, consult experts and regularly assess the availability of current industry-standards for security measures.

Article 12 Organisational Measures for Data Privacy Compliance

- (1) Stakeholders will make every effort to foster an environment showing awareness for detecting activities involving the Processing of Personal Data. As such, Stakeholders will regularly assess on the legal qualification of all data they Process. **APPENDIX 1** holds a guidance for Stakeholders to determine whether data qualifies as personal under the material scope of the GDPR.
- (2) Stakeholders undertake to Process Personal Data only to an extent that is adequate, relevant and limited to what is necessary in relation to the legitimate purposes of the explicit purpose of the Processing. Stakeholders shall refrain from any other Processing of Personal Data.
- (3) Phase approach for Processing of Personal Data: In order to safeguard the aforementioned obligations, Stakeholders undertake to establish organisational measures guaranteeing that all Processing of Personal Data under their responsibility follows a strict phased approach consisting of the following elements:
 - Primarily, Stakeholders shall duly assess, if information qualifies as Personal Data.
 - Secondly, if information qualifies as Personal Data, Stakeholders shall assess, whether the Personal Data necessarily needs to relate to an identifiable natural person for the purpose of the Processing activities. Where that is not the case, Stakeholders will make every effort to carefully anonymise the data thus removing the personal reference.
 - Finally, if Personal Data is required for the purpose of the Processing activity and/or Anonymisation is technically impossible, then the stakeholders undertake to comply with the mandatory data privacy obligations as set out by the Privacy Laws and partly substantiated in this code of conduct.

Article 13 Complying with EU Data Privacy Principles and Obligations

(1) Stakeholders undertake and warrant that all Processing of Personal Data strictly follows the principles of lawfulness, fairness and transparency. In particular, all Processing of Personal Data must be:

- based on a valid legal basis under the applicable Privacy Laws (“lawful”);
- the interests and expectations of Data Subject shall always be taken into account and never be ignored. Data Subject rights must without undue delay be handled with care and the Data Subjects’ trust may never be exploited e.g. through misconceptions (“fair”);
- Data Subjects must always be duly informed about the Processing of their Personal Data in an easily accessible manner, written in plain, intelligible and simple language (“transparent”).

(2) Stakeholders undertake and warrant that all Processing of Personal Data strictly follows the purpose limitation principle encompassing that all Personal Data only be collected and further Processed for specified, explicit as well as legitimate purposes and not further Processed in a manner that is incompatible with those purposes.

(3) Stakeholders undertake and warrant that the extent, scope and duration (including the storage) of all Processing must be limited, at best using means of technological design (privacy-by-design). Furthermore, data protection-friendly default settings must always be chosen (privacy-by-default).

(4) Stakeholders undertake and warrant to keep all Personal Data accurate and up to date by taking every reasonable step to ensure that inaccurate Personal Data are erased or rectified without delay.

(5) Stakeholders undertake and warrant to safeguard the confidentiality and integrity of Personal Data by only Processing Personal Data in a manner that ensures appropriate security, including protection against unauthorised or unlawful Processing and against accidental loss, destruction or damage, using appropriate technical or organisational measures.

(6) Stakeholders undertake and warrant to only transfer Personal Data to a third country outside the EU/EEA, if the statutory obligations under the Privacy Laws are safeguarded. In particular, this requires Stakeholders to carefully assess:

- if the recipient’s third country, territory or one or more specified sectors within that third country ensures an adequate level of protection; or
- if the Stakeholder can prove appropriate safeguards providing for enforceable Data Subject rights and effective legal remedies for Data Subjects; or
- if the Data Subject has explicitly consented to the proposed transfer, after having been informed of the possible risks of such transfers due to the absence of an adequacy decision and appropriate safeguards; or
- other derogations apply under applicable Privacy Laws.

(7) Stakeholders undertake and warrant to implement organisational safeguards to ensuring duly, complete, reliable, up-to-date and comprehensive documentation of all Processing activities and safety measures enabling to demonstrate data privacy compliance without undue delay.

Article 14 Processing under Privilege for Scientific Research

(1) Stakeholders undertake and warrant to carefully assess and continuously monitor the requirements under EU Member State laws applicable to them when relying on privileges for Scientific Research based on a GDPR opening clause.

(2) In particular, any secondary use not qualifying as Scientific Research must be carefully assessed under Privacy Laws and at best be avoided. **APPENDIX 2** holds a guidance for Stakeholders to determine whether a Scientific Research privilege may apply based on EU Member State laws making use of a GDPR opening clause.

Article 15 Awareness of- and complying with e-Privacy Laws

(1) Stakeholders undertake to keep themselves informed about applicable e-Privacy Laws.

(2) Stakeholders in particular undertake and warrant to comply with applicable e-Privacy obligations of gathering valid consent:

- for the access to information already stored in terminal equipment, or the storage of information in such terminal equipment; and
- for marketing communication such as dissemination activities e.g. via telephone or electronic message.

Chapter 3 Final Provisions

Article 16 Interaction between Fundamental Research Principles and Legal Principles

(1) To the best of their abilities, Stakeholders undertake to avoid and prevent any conflict between fundamental research principles (see Chapter 1) and legal principles (see Chapter 2) as well as any conflicts between those sets of principles.

(2) Stakeholders undertake to appropriately balance any inevitable conflicts between principles and/or sets of principles in such a way that all above principles can develop as far as possible; thus, safeguarding that neither principle is unilaterally favoured at the expense of another.

Article 17 Review of and Amendments to this Code of Conduct

(1) This code of conduct is a living document that shall be regularly reviewed and updated accordingly. It will be updated every three to five years and revised as necessary by an Expert Working Group/Committee that will be formed by the BE OPEN Steering Committee members after the end of the BE OPEN project.

(2) Stakeholders shall feel encouraged to contributing to the process of reviewing and amending this code of conduct to implement evolving concerns, challenges and opportunities in Open Science in Transport.

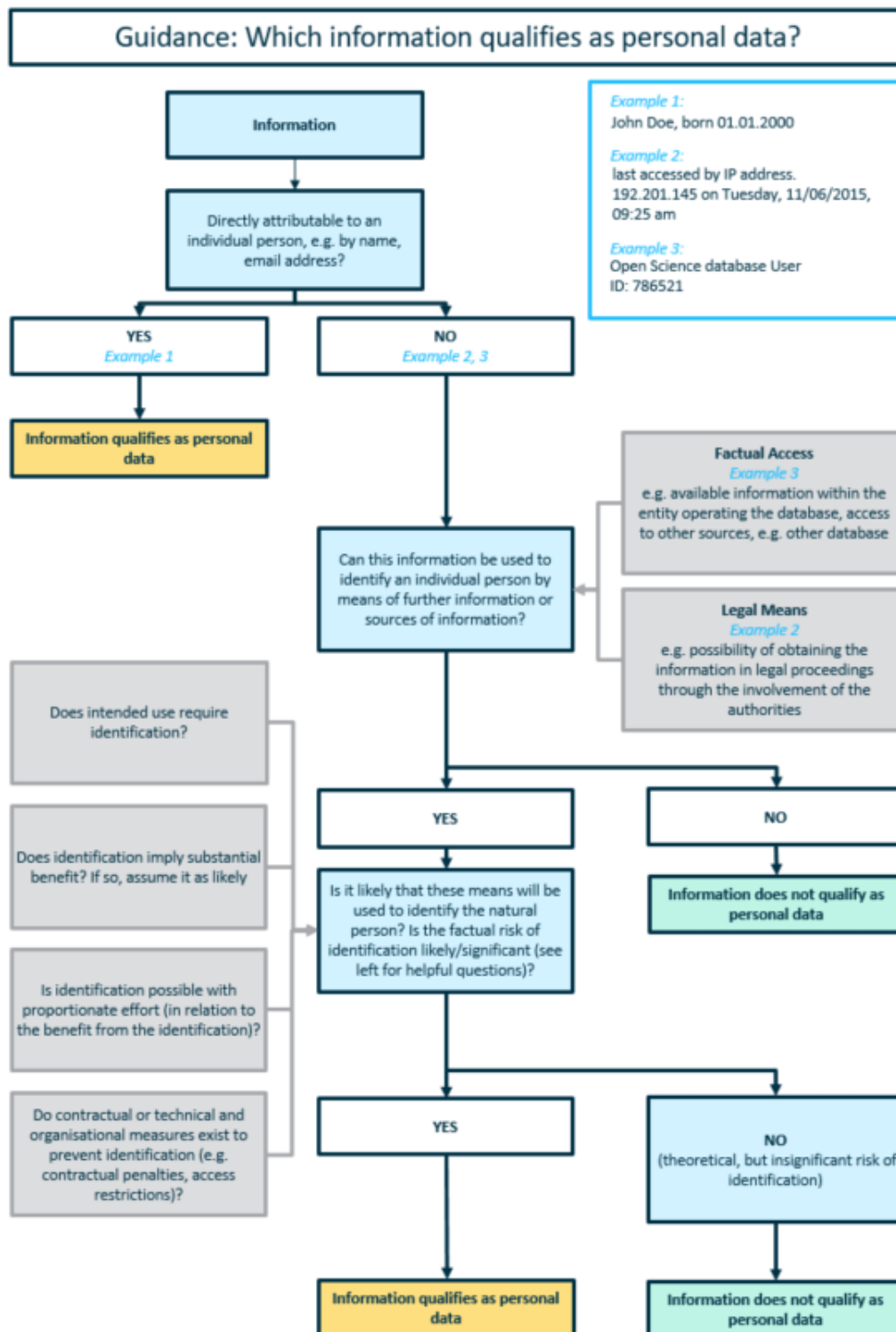


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EOSC rules of participation (2021), <https://op.europa.eu/en/publication-detail/-/publication/a96d6233-554e-11eb-b59f-01aa75ed71a1/language-en/format-PDF/source-184432576>, last accessed 12 May 2021.

Appendix 1 to Annex 1 Guideline to qualifying Information as Personal Data



Appendix 2 to Annex 1 Overview on Scientific Research Privilege under the GDPR

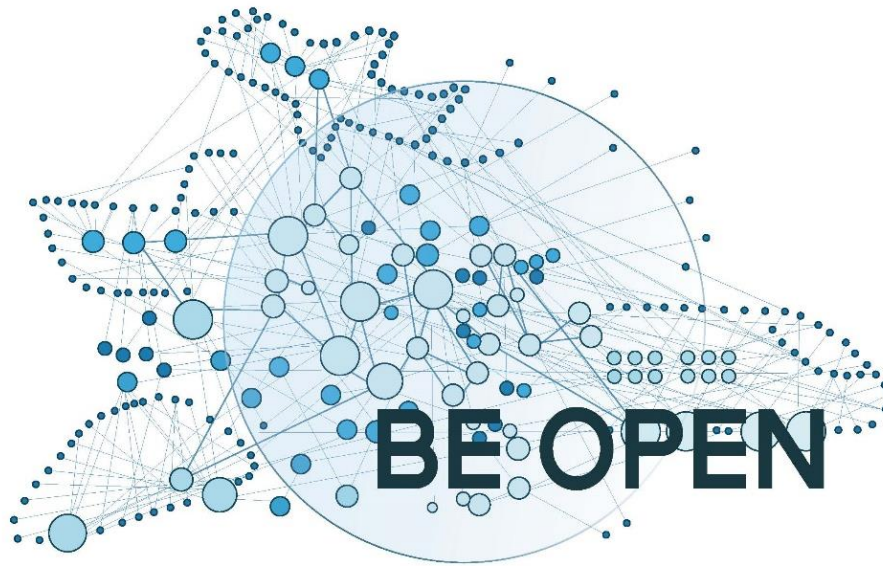
Definition of scientific Purposes	Addressee	Opening Clauses
<p>No definition in the GDPR</p> <ul style="list-style-type: none"> • Rec 159 GDPR: Scientific research purposes • To be interpreted broadly, incl. <ul style="list-style-type: none"> ○ technological development ○ demonstration ○ fundamental research ○ applied research ○ privately funded research <p>Scientific Research is commonly understood as:</p> <p><i>Independent and autonomous intellectual activity with the aim of acquiring new knowledge in a methodical, systematic and verifiable manner.</i></p>	<p>Anyone who</p> <ul style="list-style-type: none"> • independently researches • according to scientific methods • for the purpose of acquiring knowledge 	<p>Allow national exceptions, e.g.</p> <ul style="list-style-type: none"> • Art 85 Para 2 GDPR (comprehensive exceptions for academic expression) • Art 89 Para 2 GDPR (data subjects rights) • Art 5 Para 1 lit b, e GDPR (purpose and storage limitation) • Art. 9 Para 2 lit j GDPR (special categories of data) • Art 14 Para 5 lit b GDPR (Information) • Art 21 Para 6 GDPR (right to object)



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ANNEX 2 Questionnaire



European forum and oBsEratory for OPEN science in transport

Project Acronym: **BE OPEN**

Project Title: **European forum and oBsEratory for OPEN science in transport**

Project Number: **824323**

Topic: **MG-4-2-2018 – Building Open Science platforms in transport research**

Type of Action: **Coordination and support action (CSA)**

D4.4 Questionnaire

Released Version

Responders Information **required filed*

Introduction: Thank you for participating in the questionnaire developed during BE OPEN Deliverable D4.4 “European Code of Conduct on Open Science in Transport”. The main purpose of this questionnaire is to assist in the development of a Code of Conduct on Open Science in transport, which will be formed by all beneficiaries of BE OPEN project. The Code of Conduct developed will provide a regulatory and policy framework for the legal and ethical guidance needed to operationalise Open Science principles at regional, European and international level amongst the transport research stakeholders. Therefore, your contribution to this questionnaire is extremely important. We would kindly advise you to consult experts in Open Science practices within your organization in order to efficiently complete the following survey.

Abbreviations

OS	Open Science
CoC	Code of Conduct
TR	Transport Research

Name*:

Organization*:

I am giving my contribution as an individual* (selection option):

- Working for a research centre or university (e.g. university, institute, research infrastructure, etc.)
- Private researcher or student
- Working for a public service provider for transport research (e.g. policy makers, NGOs, community organizations)
- Working for a private service provider for transport research (e.g. transport network entity, commercial transport and logistic industrial operator)
- Citizen (scientist)
- Other (please specify): [textbox]

I am giving my contribution on behalf of the following type of organization* (selection option):

- Research centres and Universities
- Private research organization
- Policy makers (regional, national or international level)
- Transport networks
- NGOs and community organizations
- Commercial transport and logistics industry player
- Other (please specify): [textbox]

OS CoC in Transport Guiding Legal & Ethical Principles

How relevant is this principle to achieving one or more of the TOPOS Objectives?

Principle	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Lawfulness, Fairness and Transparency					
Mandatory purpose limitation of processed data					
Data Minimisation and Storage Limitation					
Accuracy					
Trust, Integrity and Confidentiality					
Reliability in ensuring the quality of research					
Honesty in developing, undertaking, reviewing, reporting and communicating research					
Respect for colleagues, research participants, society, ecosystems, cultural heritage and the environment					
Accountability for the research from idea to publication, for its management and organisation, for training, supervision and mentoring, and for its wider impacts					

If you want to comment on your answers, please elaborate (max. 2,000 characters): [textbox]

Priorities

How relevant is this priority to achieving one or more of the TOPOS Objectives?

Priorities	Highly relevant	Relevant	Neutral	Irrelevant	Highly irrelevant
Implement Persistent Identifier (PID) Policy					
Cross-sector or multi-modal data harmonization and interoperability protocols					
Big data & Artificial Intelligence applications and data handling toolboxes					
Personal & Proprietary (sensitive) data protection framework					
FAIR Metrics & Certification					
User research and data provision Environments					
Common Interoperability framework within transport research community					
Skills & Training					
Rewards & Recognition schemes					
Defined cooperation standards & procedures within organizations					
Promotion of transport research data & publications					
Scientific product (e.g. data, software, etc.) review, evaluation and editing rights					

At which level should each priority be progressed?

Priorities	Institutional	National/ Regional	European
Implement Persistent Identifier (PID) Policy			

Cross-sector or multi-modal data harmonization and interoperability protocols			
Big data & Artificial Intelligence applications and data handling toolboxes			
Personal & Propertary (sensitive) data protection framework			
FAIR Metrics & Certification			
User research and data provision Environments			
Common Interoperability framework within transport research community			
Skills & Training			
Rewards & Recognition schemes			
Defined cooperation standards & procedures within organizations			
Promotion of transport research data & publications			
Scientific product (e.g. data, software, etc.) review, evaluation and editing rights			

If you want to comment on your answers, please elaborate (max. 2,000 characters): [textbox]

If you think any important priorities are missing, please indicate which ones, and explain why these are important to achieving the capitalization of European Code of Conduct on Open Science in Transport (max. 3,000 characters): [textbox]