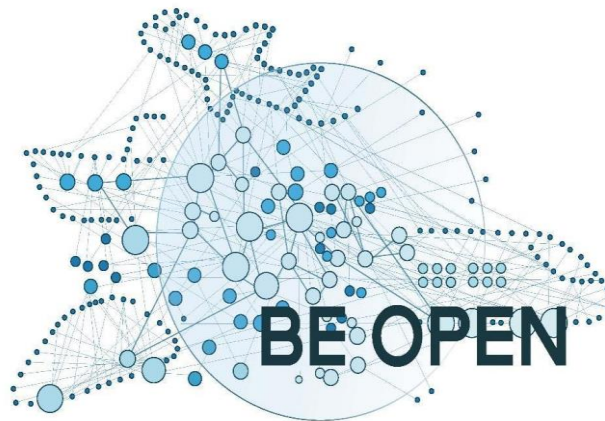




This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824323

This document reflects only the views of the author(s). Neither the Innovation and Networks Executive Agency (INEA) nor the European Commission is in any way responsible for any use that may be made of the information it contains.



European forum and oBsErvatory for OPEN science in transport

Project Acronym:	BE OPEN
Project Title:	European forum and oBsErvatory 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)

D 4.3 New business models to implement Open Access in transport research

FINAL



D4.3: New business models to implement Open Access in transport research

Deliverable Title:	New business models to implement Open Access in transport research
Work Package:	WP4
Due Date:	October 2020
Submission Date:	December 2020
Start Date of Project:	1 January 2019
Duration of Project:	30M
Organisation Responsible of Deliverable:	Konnektable Technologies Ltd. (KT)
Version:	V1.0
Status:	Final
Author name(s):	Vasileios Zaritas (KT), Nikolaos Angelopoulos (KT)
Reviewer(s):	
Nature:	<input checked="" type="checkbox"/> R – Report <input type="checkbox"/> P – Prototype <input type="checkbox"/> D – Demonstrator <input type="checkbox"/> O - Other
Dissemination level:	<input checked="" type="checkbox"/> PU - Public <input type="checkbox"/> CO - Confidential, only for members of the consortium (including the Commission) <input type="checkbox"/> RE - Restricted to a group specified by the consortium (including the Commission Services)

Document history			
Version	Date	Modified by (author/partner)	Comments
V0.1	14/09/2020	Vasileios Zaritas (KT) Nikolaos Angelopoulos (KT)	ToC
V0.2	21/09/2020	Vasileios Zaritas (KT) Nikolaos Angelopoulos (KT)	Chapter 1.1, Chapter 2.1-2.3, Chapter 4.1, Chapter 5 description, Annex
V0.3	02/10/2020	Vasileios Zaritas (KT) Nikolaos Angelopoulos (KT)	Afroditi Anagnostopoulou (CERTH), Attila Akac(CERTH), Alessia Bardi (CNR), Harry Dimitropoulos (ARC) and Christian von Buehler (OSC) provided additions and comments on V0.2
V0.4	16/10/2020	Nikolaos Angelopoulos (KT)	Address the comments, Content enrichment throughout the document
V0.5	21/10/2020	Nikolaos Angelopoulos (KT)	Analysis of the survey results and incorporation of the results to Chapters 4, 5 and 6. Chapter 6, References.
V0.6	26/10/2020	Vasileios Zaritas (KT)	Chapter 3
V0.7	27/10/2020	Nikolaos Angelopoulos (KT)	Executive summary, Slight restructure of the content
V0.8	13/11/2020	Vasileios Zaritas (KT), Nikolaos Angelopoulos (KT)	Comments and suggestions from Christian von Buehler (OSC), Afroditi Anagnostopoulou (CERTH) and Attila Akac (CERTH).
V0.9	14/12/2020	Vasileios Zaritas (KT), Nikolaos Angelopoulos (KT)	Address comments made by the Advisory Board. Wouter Schallier (CEPAL),



D4.3: New business models to implement Open Access in transport research

			Tatiana Kováčiková (UNIZA), Lily Elefteriadou (UFL)
V1.0	26/12/2020	Vasileios Zaritas (KT), Nikolaos Angelopoulos (KT)	Addressed comments made by the internal reviewers. Rudolf Cholava (CDV), Kristel Palts (DLR) Final Draft



Contents	1
i. List of Figures	6
ii. List of Tables	6
iii. Executive summary	8
1 Introduction	9
1.1 Purpose of the document	9
1.2 Definitions of frequently used terms	9
2 Overview of Business Models involving Open Access	10
2.1 Business Model frameworks	10
2.2 Commonly used frameworks	11
2.3 Business Models taking Open Access into consideration	15
2.4 Summarising the findings	18
3 Open Access in Transport	19
3.1 Pivotal Actors and Open Access	19
3.2 Barriers and opportunities in Open Access	20
3.3 Ways forward in Open Access	22
4 Survey questionnaire on implementing Open Access in transport research	23
4.1 Methodology	23
4.2 Questionnaire design	23
4.3 Distribution and Analysis	24
5 Survey results	25
5.1 Organisation information	25
5.2 Products and services	26
5.3 Targeted Market and Customers	27
5.4 Pricing - Revenue stream	31
5.5 Use of Open Access data	33
6 Analysis of the findings	36
6.1 The importance of Open Access	36
6.2 The use of Open Access data	37
6.3 Products and Services through Open Access	38
6.4 Open Access revenue streams	40
6.5 Customer segmentation	41



7	Conclusions	44
I.	References – Literature review	45
II.	Annex	50
	Open Access Business Model survey - Questionnaire	50

List of Figures

Figure 1: Business reference model overview.....	11
Figure 2: IBM's Component Business Model template	11
Figure 3: Alexander Osterwalder and Yves Pigneur's Business Model Canvas	12
Figure 4: Open Business Model canvas	14
Figure 5: Opportunities and benefits of a TRC (source: Kovacikova et Al., 2018).....	20
Figure 6: Percentage of the responses in question 31.	24
Figure 7: Count of the responses in question 6, per area	25
Figure 8: Percentage of the responses in question 7.	26
Figure 9: Count and percentage of the responses in question 8, per different service/product	26
Figure 10: Count and percentage of the responses in question 9.	28
Figure 12: Count and percentage of the responses in question 11, per kind of targeted organisation.....	29
Figure 11: Percentage of the responses in question 10.	29
Figure 13: Count and percentage of the responses in question 12, per kind of individual. ...	30
Figure 14: Count and percentage of the responses in question 13.	31
Figure 15: Percentage of the responses in question 14.	32
Figure 16: Percentage of the responses in question 18.	33
Figure 17: Count and percentage of the responses in question 17.	33
Figure 18: Count and percentage of the responses in question 22.	34
Figure 19: Percentage of the responses in question 23.	34
Figure 20: Count and percentage of the responses in question 26.	35
Figure 21: Percentage of the responses in question 27.	35
Figure 22: Percentage of the respondents' role in relation with Open Access data.....	37
Figure 23: Percentage of the importance of each Open Access data related role based on the respondents' answers.....	39
Figure 24: Count and percentage of the “Freemium”-related responses.....	41
Figure 25: Overview of the count and percentage for each of the targeted areas.	42

List of Tables

Table 1: Overview of the responses in question 6.	25
Table 2: Overview of the responses in question 8.	27
Table 3: Overview of responses in question 9, after re-grouping the answers per area	28



D4.3: New business models to implement Open Access in transport research

Table 4: Overview of the responses in question 11.	30
Table 5: Overview of the responses in question 13, after re-grouping the responses	32
Table 6: Count and percentage of the importance of each Open Access data related role based on the respondents' answers.....	39

Executive summary

This deliverable aims at providing an overview of Open Access in transport and proposing generic business models to implement Open Access in transport research. To this end, an extensive literature review has been conducted to help formulate a process to follow towards the achievement of this objective; and a survey questionnaire was designed and circulated amongst BE OPEN partners and their network of transport research organisations and associations.

More specifically, chapter 2 provides an overview on business models and the different frameworks used for the formulation of the business models. In this chapter we also find a brief explanation of the various business models involving Open Access.

Chapter 3 is painting the picture of Open Access in transport, giving insights on important actors, barriers and opportunities, as well as the way forward for Open Access.

The next chapter (chapter 4) refers to the methodology used in the development of the questionnaire survey and the steps that followed until the reception of the answers.

Based on the results of the analysis, the most valuable part of the result are presented in chapter 5 followed by a primary interpretation of the results.

After presenting the key findings of the survey, chapter 6 is offering the analysis of the results and their transformation into valuable insights towards actionable knowledge. Analyses are made and conclusions are drawn in the course of this chapter.

At first, we presented what constitutes a business model and how it can include Open Access. Following, we saw the status of Open Access in transport research data and of the identified actors, needs, obstacles and opportunities to grip on and move forward. Then, we designed and distributed a survey to involved actors and analysed the results under the prism of this deliverable's objectives. Much like this paragraph, chapter 7, sums up what was presented in the previous chapters and draws valuable conclusions for the reader.

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 to promote 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 4.3 is to propose generic Business Models that can be implemented to further enable and enhance Open Access in transport Research. This includes the following objectives:

- to register the variety of the Business Models involving Open Access;
- to highlight innovative and self-sustainable Business Models involving Open Access

In this regard qualitative and quantitative analysis and info have been incorporated in this deliverable, which can guide and support all aspiring researchers in the domain of Open Access in transport research. It should be noted that an online survey questionnaire was used instead of the realisation of an interactive workshop due to the COVID-19 pandemic.

1.2 Definitions of frequently used terms

To provide the reader with a better understanding of the content to follow, the definitions of some frequently used terms cited below:

- **Open Science**¹: the practice of science in such a way that others can collaborate and contribute, where research data, lab notes and other research processes are freely available, under terms that enable reuse, redistribution and reproduction of the research and its underlying data and methods.

¹<https://www.fosteropenscience.eu/foster-taxonomy/open-science-definition> last accessed on 14/12/2020.



- **Open Access²:** a set of principles and a range of practices through which research outputs are distributed online, free of cost or other access barriers. Some frequently used Open Access models are *Gold*, *Green* and *Hybrid*.
- **Open Data³:** data that are freely available to everyone to use and republish as they wish, without restrictions from copyright, patents or other mechanisms of control.
- **Open Access (to) data:** data that are being provided in Open Access.

2 Overview of Business Models involving Open Access

2.1 Business Model frameworks

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. Even though it is not quite clear at which extent they actually play an important role in business modelling, these frameworks were developed in order to capture and represent the core of any organisation involving both internal (performance metrics, market analysis etc.) and external (PESTLE analysis, competition etc.) factors⁴. A business model framework would involve the following aspects of an organisation's activities:

- **STP process** – the process through which each organisation concludes on its targeted customers and the way of positioning its product(s)/service(s). STP stands for:
 - **Segmentation:** the division of the market into distinct groups of customers (segments) after identifying the basis for segmentation and determining the important, unique, characteristics of each group.
 - **Targeting:** the evaluation and selection of the most attractive market segment to focus on.
 - **Positioning:** the definition of how the organisation would make its product(s)/service(s) available to its targeted customers.
- **Tasks towards the goal** – the actions that are to be executed to achieve the desired and set objectives, including tasks that are going to be outsourced as well.
- **Resource allocation** – the definition and configuration of the resources necessary for the task implementation.
- **Go-to-market phase** – the way each organisation is offering their product's or service's unique value proposition utilising both internal and external resources.

² Fecher, B., & Friesike, S. (2014). Open Science: One Term, Five Schools of Thought. In *Opening Science* (pp. 17–47). Springer International Publishing. https://doi.org/10.1007/978-3-319-00026-8_2

³ Ayre, L. B., & Craner, J. (2017). Open Data: What It Is and Why You Should Care. *Public Library Quarterly*, 36(2), 173–184. <https://doi.org/10.1080/01616846.2017.1313045>

⁴ Arreola González A., Pfaff M., Krcmar H. (2019) Business Model Representations and Ecosystem Analysis: An Overview. In: Themistocleous M., Rupino da Cunha P. (eds) *Information Systems. EMCIS 2018. Lecture Notes in Business Information Processing*, vol 341. Springer, Cham. https://doi.org/10.1007/978-3-030-11395-7_36

- **Value creation** – the process through which each organisation is creating value for the customer.
- **Revenue stream** – the process of capturing profit.

2.2 Commonly used frameworks

Following are some of the most commonly used business model frameworks:

- **Business reference model** – focuses on the architectural aspects of the core business of each organisation. It is constructed in layers and can be viewed as a function-driven framework that describes the business operations of each organisation embodying its basic goals and ideas, independently from the organisational structure performing these operations⁵.

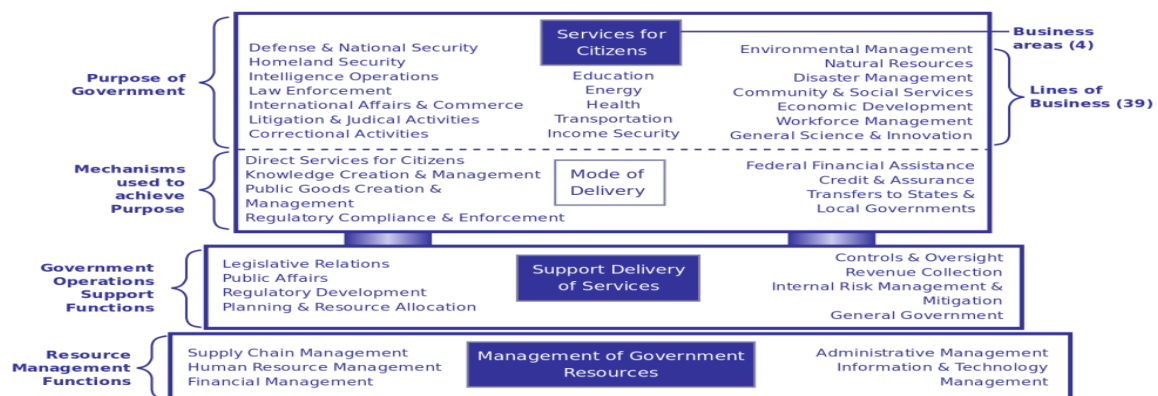


Figure 1: Business reference model overview

- **IBM's Component Business Model** – developed by IBM, it is a single-page representation of the mapping of the business components and it can be used to analyse the alignment of the organisation's strategy with its capabilities, identify overlaps and redundancies and create a unified roadmap towards the achievement of the set objectives⁶.



Figure 2: IBM's Component Business Model template

⁵ Fettke, P., Loos, P., & Zwicker, J. (2005). Business process reference models: Survey and classification. Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 3812 LNCS, 469–483. https://doi.org/10.1007/11678564_44

⁶ IBM Global Business Services Component business models Making specialization real, <https://www.ibm.com/downloads/cas/8RB5RWVE> last accessed on 21/10/2020.

Business Model Canvas – developed by Alexander Osterwalder and Yves Pigneur (2013) after conducting research for nine years and involving within the research activities 470 co-authors from 45 countries, it breaks down a business model into

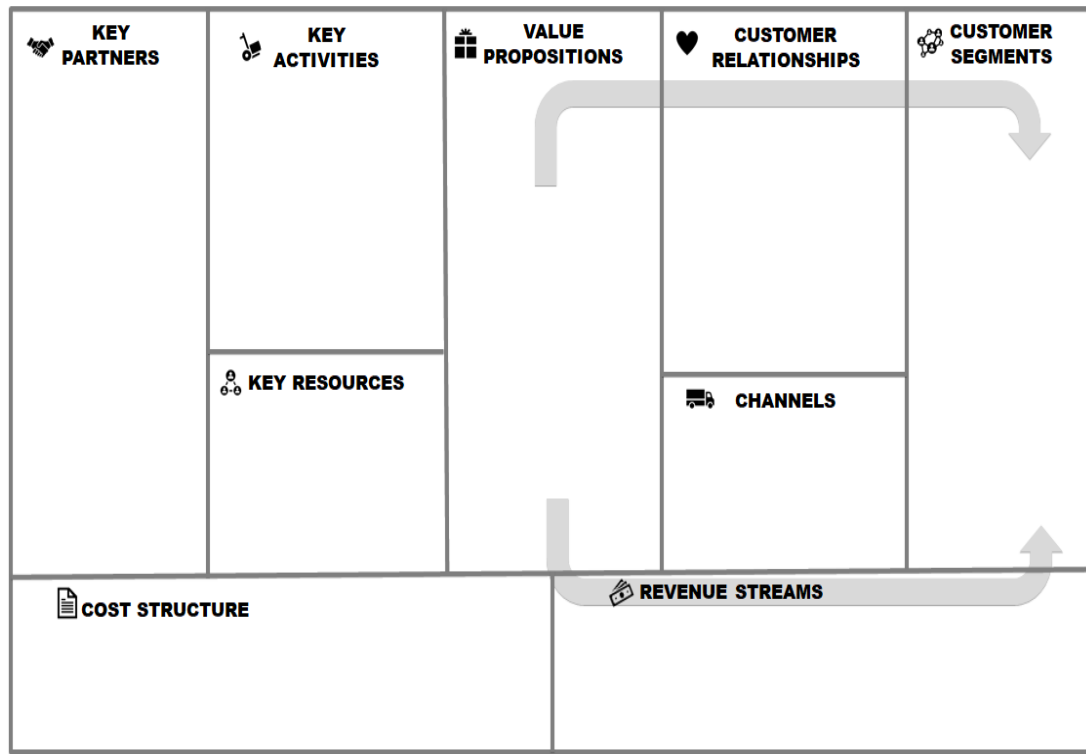


Figure 3: Alexander Osterwalder and Yves Pigneur's Business Model Canvas nine core building blocks⁷.

Making a step forward from past designs using four core blocks such as:

- **Hamel's (2000)⁸**
 - Customer logic – the relationship between the organisation and the client
 - Strategy – the mission of the organisation
 - Resources – what the organisation does, knows and possesses
 - Network – partnerships that enable the organisation's operation
- **Shafer, Smith and Linder's (2005)⁹**
 - Strategic choices – the strategic decisions of an organisation to maximise its value proposition
 - Value creation – the process and way an organisation differentiates its product(s)/service(s) offerings from the competitors

⁷ Osterwalder, Alexander; Pigneur, Yves; Clark, Tim (2010). *Business Model Generation: A Handbook For Visionaries, Game Changers, and Challengers*. Strategyzer series. Hoboken, NJ: John Wiley & Sons. ISBN 9780470876411.

⁸ Hamel, G. (2000) Leading the revolution, Harvard Business School Press, Boston

⁹ Shafer, Scott M., Smith, H. Jeff and Linder, Jane C., (2005), The power of business models, Business Horizons, 48, issue 3, p. 199-207



D4.3: New business models to implement Open Access in transport research

- Capture value – the outline of how an organisation presents its product(s)/service(s).
- Value network – structure of partnerships enabling the organisation's operation
- **Johnson and Christensen (2010)**¹⁰
 - Revenue model – quantity of units sold multiplied by unit price
 - Cost structure – direct and indirect costs and overheads
 - Margin model – separated from the cost structure to ensure that margin is not mistaken for the entire profit formula
 - Resource velocity – a measurement of how quickly money flow through the organisation

The **Business Model Canvas**' nine building blocks are:

1. **Key partners:** the definition of partnerships and relevant actors and stakeholders enabling the organisation's operation.
 2. **Key activities:** the definition of the main activities necessary for the operation of the organisation.
 3. **Key resources:** the main assets necessary for the organisation's operation.
 4. **Value proposition:** the range of product(s)/service(s) targeted at the desired customer segment.
 5. **Customer relationship:** the relationship that an organisation has with its targeted customers.
 6. **Customer segment:** the labelling of the targeted groups of people that an organisation seeks to approach.
 7. **Channel:** the ways an organisation reaches out to its targeted customers and offer their unique value proposition.
 8. **Cost structure:** the outline of the expenses involved in the organisation's operation.
 9. **Revenue stream:** the outlines of the revenue an organisation generates from its targeted customers.
-
- **Open Business Model Canvas** – created by Paul Stacey and his colleagues from Creative Commons (2015). Along with the promotion and adoption of Open Science procedures and protocols, arose questions about the sustainability of Open Data-driven organisations. To help defining a business model which incorporates free and open licensing Stacey and his colleagues proposed the following canvas¹¹.

¹⁰ Johnson, B., Christensen, L. (2010) Educational Research: Quantitative, Qualitative, and Mixed Approaches, SAGE Publications, ISBN: 9781412978286

¹¹ *What is an Open Business Model and How Can You Generate Revenue?*, by Paul Stacey, Made with Creative Commons, Medium, <https://medium.com/made-with-creative-commons/what-is-an-open-business-model-and-how-can-you-generate-revenue-5854d2659b15> last accessed on 21/10/2020.

Key Partners Who are our Key Partners? Who are our key suppliers? Which Key Resources are we acquiring from partners? Which Key Activities do partners perform? Motivations for Partnerships Optimization and economy Reduction of risk and uncertainty Acquisition of particular resources and activities	Key Activities What Key Activities do our Value Propositions require? Our Distribution Channels? Customer Relationships? Revenue streams? Categories Production Problem Solving Platform/Network Key Resources What Key Resources do our Value Propositions require? Our Distribution Channels? Customer Relationships? Revenue Streams? Types of resources Physical Intellectual (brand patents, copyrights, data) Human Financial	Value Proposition What value do we deliver to the customer? Which one of our customer's problems are we helping to solve? What bundles of products and services are we offering to each Customer Segment? Which customer needs are we satisfying? Characteristics Newness Performance Customization "Getting the Job Done" Design Brand/Status Price Cost Reduction Risk Reduction Accessibility Convenience/Usability	Customer Relationships What type of relationship does each of our Customer Segments expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they? Examples Personal assistance Dedicated Personal Assistance Self-Service Automated Services	Customer Segments Who are our most important customers? Mass Market Niche Market Segmented Diversified Multi-sided Platform
Cost Structure What are the most important costs inherent in our business model? Which Key Resources are most expensive? Which Key Activities are most expensive? Is your business more Cost Driven (leanest cost structure, low price value proposition, maximum automation, outsourcing) Value Driven (focused on value creation, premium value proposition)	CC License Which Creative Commons license will I use? How does license choice affect the business? Categories Public Domain Mark CC0 CC BY CC BY-SA CC BY-ND CC BY-NC CC BY-NC-SA CC BY-NC-ND	Social Good Beyond revenue and profits what social good is generated by this business?	Revenue Streams For what value are our customers really willing to pay? For what do they currently pay? How are they currently paying? How would they prefer to pay? How much does each Revenue Stream contribute to overall revenues? Types Asset sale Usage fee Subscription Fees Lending/Renting/Leasing Licensing Brokerage fees Advertising Fixed Pricing List price Product feature dependent Customer segment dependent Volume dependent Dynamic Pricing Negotiation (bargaining) Yield management Real-time market	

Figure 4: Open Business Model canvas

To help tackle concerns deriving both from the public and private sector, the authors took Osterwalder and Pigneur's canvas and made the addition of two extra building blocks, **CC licence** and **Social good**.

- a. **CC licence** – determines what CC licence the organisation needs to operate. The different types of CC licences are¹²:




- **Public Domain Mark**: a symbol used to indicate that a work is free of known copyright restrictions and therefore in the public domain.
- **No copyright reserved CC0**: the "no copyright reserved" option effectively means relinquishing all copyright and similar rights that you hold in a work and dedicating those rights to the public domain.
- **Attribution CC BY**: lets others distribute, remix, tweak and build upon one's work, even commercially, as long as they credit the original creator.
- **Attribution ShareAlike CC BY-SA**: lets others remix, tweak and build upon one's work, even for commercial purposes, as long as they credit the original creator and licence their new creations under identical terms.
- **Attribution-NoDerivs CC BY-ND**: allows redistribution, commercial and non-commercial, as long as it is passed along unchanged and in whole, with credit to the original creator.



¹² <https://creativecommons.org/licenses/> last accessed on 21/10/2020.



D4.3: New business models to implement Open Access in transport research

- **Attribution-NonCommercial CC BY-NC:** lets others remix, tweak and build upon one's work, non-commercially, and although the new works must also acknowledge the original creator and be non-commercial, they don't have to license their derivative works on the same terms. 
 - **Attribution-NonCommercial-ShareAlike CC BY-NC-SA:** lets others remix, tweak and build upon one's work, non-commercially, as long as they credit the original creator and license their new creations under identical terms. 
 - **Attribution-NonCommercial-NoDerivs CC BY-NC-ND:** only allows others to download one's work and share with others as long as they credit the original creator, but they cannot change the work in any way or use it commercially. 
- b. Social good – describes the social contribution of the organisation beyond revenue and profit.

2.3 Business Models taking Open Access into consideration

Before we take a look into the business models, and for grasping a better understanding of how Open Data change the “game”, we should briefly mention the new user categories that have emerged along with the increase in businesses and individuals applying Open Access to their generated work.

- a. **Open Data providers:** organisations that are issuing and distributing Open Data
- b. **Service providers – Intermediaries:** organisations that offer services on open datasets and act as intermediaries for the Open Access data providers and the final users. They are usually either **i) aggregators**, offering a consolidated specific dataset after collecting and combining Open data, or **ii) enrichers**, providing better insights based on the utilisation of Open data.
- c. **Service developers and Infrastructure providers – Enablers:** organisations that are responsible for producing value for the final user. **i) Service developers** collaborate with relevant stakeholders to realise innovative services that utilise Open Data, and **ii) infrastructure and tool providers** are providing the necessary tools to the rest of the actors.
- d. **Final consumers – Users:** they consume the generated work, whether that is an Open Data-driven application or service.

For an organisation to be able to extract and capture the increasing value of Open data it is important to define new business models, ones that would improve the commercial activities of the organisation by providing the framework within which open datasets can be organised, maintained, updated and managed in a correct and timely manner.

Some of the identified business models designed and used by *Open Access data providers* and/or *Intermediaries* and/or *Users* are listed below:



D4.3: New business models to implement Open Access in transport research

- **Freemium¹³**

Even though the term was coined later on (2006), this business model's practise dates back to 1980's. It is essentially a model through which an organisation provides a basic set of features of its product(s)/service(s) for free, and charges a premium for advanced and/or supplemental features. Improvements in technology and the manifestation of the learning curve tend to lower the marginal cost of an offered product or service, enabling more businesses to offer a basic, free of charge, product, as they can have sustainability with just a small percentage of the users paying for the premium version.

- **Premium¹⁴**

A business model concept that aims at providing high-end products/services. For the realisation of this business model, brand positioning is one of the key elements, as it is essential to own the desired place in the target consumer's mind. *Rolex*, *Rolls Royce* and *Bentley* are some premium-model businesses and they are targeting lower sales volume while seeking high profit margins.

- **Open Source¹⁵**

This business model is used by organisations that offer open source code, meaning that anyone can access, edit and distribute it. Open source businesses offer their source code for free and can later charge the user on an "added-value" basis. Another approach that emerged through open source offering is *dual licensing*, where the organisation would offer the same software under two different licences, an open source one, and a proprietary one.

- **Demand-oriented platform¹⁶**

This model is adopted by businesses that offer customised open datasets through platforms capable of converting open datasets into valuable data streams. Minimising both search and, ultimately, transaction costs adds significant contribution to the democratisation and commoditisation of Open Data. Given that the outcome is free and open, the provider cannot charge without added value on top of it, therefore the revenue is generated by the provision of advanced services and refined datasets and data flows.

- **Supply-oriented platform¹⁷**

The particular business model concept revolves around the storing, maintaining and managing of Open Data for any data holders. Businesses undertaking this business model provide maintenance services and easy access to their customers, usually in return for a monthly fee determined by:

¹³ Freemium Definition <https://www.investopedia.com/terms/f/freemium.asp> last accessed on 21/10/2020.

¹⁴ Premium business model – Wikipedia https://en.wikipedia.org/wiki/Premium_business_model last accessed on 21/10/2020.

¹⁵ Council Post: How Open Source Became The Default Business Model For Software <https://www.forbes.com/sites/forbestechcouncil/2018/07/16/how-open-source-became-the-default-business-model-for-software/#1a413ec94e72> last accessed on 21/10/2020.

¹⁶ Open data economy: Eight business models for open data and insight from Deloitte UK – O'Reilly <https://www.oreilly.com/content/open-data-business-models-deloitte-insight/> last accessed on 21/10/2020.

¹⁷ Supply-side platform – Wikipedia https://en.wikipedia.org/wiki/Supply-side_platform last accessed on 21/10/2020.



D4.3: New business models to implement Open Access in transport research

- a. *the level of solution sophistication*, according to Ferro & Osella some of the features to characterise the sophistication of the solutions are **i)** registration of a domain name, **ii)** presence of a workflow engine, **iii)** automated geo-referencing of spatial data, **iv)** integration with analytical tools aimed at monitoring Web traffic, etc.
 - b. *the technical parameters*, quantitative parameters that have an impact on the price of the data are **i)** data storage size, **ii)** data delivery bandwidth per time-period and **iii)** the number of API calls per time-period.
- **Razor and Blades¹⁸**

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”. “Blades” (products) in this case are considered *inelastic*, unaffected by changes in income and price, creating a high profit margin contributing to the profitability of the organisation.
 - **Free, as branded advertising¹⁹**

The provider organisation that uses this business model aims at leading the customer to a specific brand. By making the brand’s data accessible, it enhances their visibility and helps attract customers with the utilisation of open data. From the brand’s standpoint the cost can be considered as promotional cost as it would result in a powerful advertising boost.
 - **White-label development²⁰**

This business model applies to organisations that do not have sufficient in-house resources, essential for achieving their goals and objectives. The product/service is built at first by one organisation and then customised by another one. The first organisation can benefit from the absence of marketing worries and needs, making their product/service as cost-effective possible. The organisation that purchases the initial product/service can benefit from the fact that their purchase is unbranded and they have the right to customise it and pursue high profit margins.

Below, are some of the defined business models addressing specifically *Open Access data providers’* needs in order to create value from Open data:

- **Sponsorship²¹**

The notion of giving away a product/service that has been made available for free through the provision of money from sponsors. These sponsors are usually organisations motivated by the belief that a specific dataset should be Open and accessible by everyone.

¹⁸ Razor-Razorblade Model: Overview <https://www.investopedia.com/terms/r/razor-razorblademodel.asp> last accessed on 21/10/2020.

¹⁹ Open data economy: Eight business models for open data and insight from Deloitte UK – O’Reilly <https://www.oreilly.com/content/open-data-business-models-deloitte-insight/> last accessed on 21/10/2020.

²⁰ White Label Product Definition <https://www.investopedia.com/terms/w/white-label-product.asp> last accessed on 21/10/2020.

²¹ Sponsor (commercial) – Wikipedia [https://en.wikipedia.org/wiki/Sponsor_\(commercial\)](https://en.wikipedia.org/wiki/Sponsor_(commercial)) last accessed on 21/10/2020.



- **Supporting primary business**
Open data, in this case, is 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 licensing²²**
As already mentioned above while explaining the *Open Source* business model, this model refers to the 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**
A business model best suited for organisations that are operating around Open Data, where the provider organisation offers data availability paired with packages and licences that offer extended services.
- **Increasing quality through participation**
In order to increase the quality of their offered product(s)/service(s) and, eventually, generate higher margins, an organisation relies on the contribution of third parties to the maintenance of their Open data, increasing 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. Provided that the data is used to give insights on products/services addressing various customer needs, publishing those data with Open Access can save the publishers a significant amount of money.

2.4 Summarising the findings

Following the principle suggested by Zeleti, Ojo and Curry (2014)²³, we will summarise the above mentioned business models addressing the needs of the publishers of Open Access data into three categories:

- A. **Freemium** - offer an initial product/service for free and provide a paid for, "added value" product/service.
- B. **Cross subsidy** - reach out to more customers, or extend the product/service offered to existing customers via widening the sharing and use of Open Access data.
- C. **Network effects** - reduced costs in data maintenance through the collaboration with

Besides this, Zeleti, Ojo and Curry used the 15 business models involving open data described above, applied by open data suppliers, intermediaries and final consumers, to draw emerging business models (2014). They condensed all of them into a six-box model and thus named it the 6- V Business model framework:

²² Manenti, Fabio M., Comino, Stefano (2011) Dual Licensing in Open Source Software Markets SSRN Electronic Journal

²³ Zeleti, Fatemeh Ahmadi, Ojo, Adegboyega, Curry, Edward (2014) *Emerging business models for the open data industry: Characterization and analysis*, doi: 10.1145/2612733.2612745



- **Value proposition**, which states the solution that a business is providing. This box describes the product, services, its distribution channel, information and price.
- **Value adding process**, which specifies the activities and resources that a business has to create value. This includes physical resources, human resources, supply chain management, partnerships and technology.
- **Value in return**, which defines the value (monetary or non-monetary) that a business gains with its product or services. This can be advertising space, future contracts, opportunities, profit or commission.
- **Value capture**, which refers to the means of catching some percentage of the value offered and using it to support the value proposition.
- **Value management**, which describes the management structure of a business. It includes an organisation's culture, mindset, stakeholders and shareholders.
- **Value network**, which helps a business deliver its value and perform to its best. This involves customers, business partners, suppliers, service flow, product flow and information flow.

Through this model, they defined categories of business models involving open data based on value propositions because they believed that it identifies the direction of a business and helps it find their revenue streams (2014). Consequently, the authors grouped the 15 frameworks into five categories of business models:

- **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)

3 Open Access in Transport

3.1 Pivotal Actors and Open Access

Although open access and sharing of data has been an ever-growing trend since the turn of the century and despite the increasing number of open-access institutional bodies committed to such cause, there are still several challenges to be addressed regarding open-access practices in the transport sector. Primarily, this has been the case due to the sheer size, the large amounts of data, diverse set of actors as well as the various field-areas that are involved in the transport sector. Yet, according to a High-Level Expert Group (EC, 2016), many of the challenges still seem to be cultural in nature rather than technical. To tackle such difficulties, certain initiatives such as the international Transport Research Cloud (TRC) and the European Union's Open Science Cloud (EOSC), have effectively documented several barriers and opportunities, following an "inherently cross-disciplinary" (Kovacikova et. Al,

2018: 4²⁴) methodology which reflects the morphology of the field, aiming to be an active facilitator of the standards, infrastructure and training programs for the Commission and all other actors involved in the transport sector, as well as defining what transport-related data is or how such data should be processed. Such contributions and efforts are worth taken into consideration by any relevant stakeholder in the field of open access-transport, since it is through such approaches that may provide the most insightful guidelines and evaluations of the terrain that will be created by the EC's Strategic Implementation Roadmap regarding the European Open Science Cloud, as well as all sectors that will be affected throughout its development. EC supports online and free-of-charge access to scientific results and information derived by Horizon 2020 EU funded projects imposing article 29.2 in Model Grant Agreements²⁵. In addition, what needs to be taken into consideration is the increasing engagement of Supra National organisations, such as the United Nations, World Trade Organisation, World Bank, etc., with open access methodologies, the models of international research collaboration overall that develop along those lines, as well as the added value that comes along with such developments overall.

3.2 Barriers and opportunities in Open Access

Barriers for Open Access have been already determined and presented within the scope of the work done in the Be Open project. More specifically, D2.2 *Open/FAIR data, software and infrastructure in European transport research* and D4.1 *Open Science in transport research: legal issues and fundamental principles* both address issues related to Open Science and Open Access. In this deliverable, some of the barriers are presented

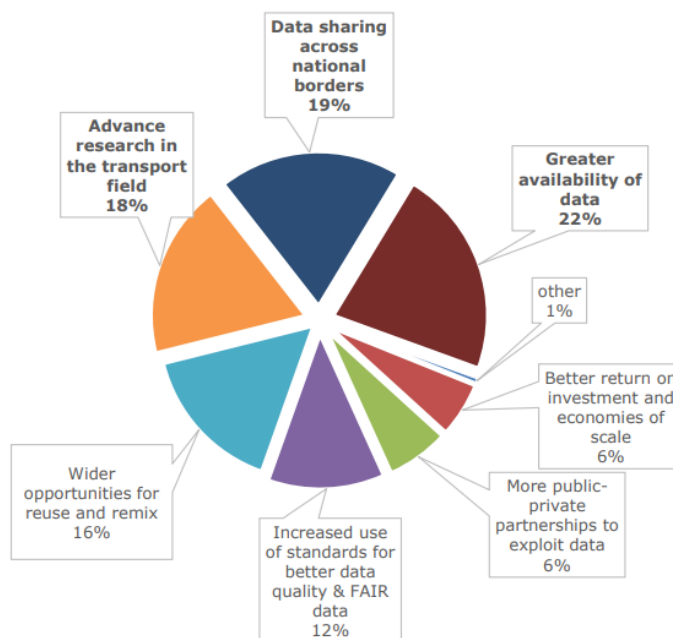


Figure 5: Opportunities and benefits of a TRC (source: Kovacikova et Al., 2018)

²⁴ https://trimis.ec.europa.eu/sites/default/files/documents/ki0318383enn.en_.pdf (last accessed on 21/10/2020)

²⁵ <https://ec.europa.eu/research/openscience/index.cfm?pg=openaccess> (last accessed on 21/10/2020)



D4.3: New business models to implement Open Access in transport research

The need for all involved actors in Open Access to incorporate a cross-disciplinary perspective is only reinforced by the latest developments coming from the fields of Information and Communication Technologies (ICT), Artificial Intelligence (AI), Machine Learning (ML), Cloud computing and the Internet of Things (IoT).

Although these developments can clearly contribute to economic and technological growth as businesses and researchers gain access to the data enabled by the operationalization of such technologies in the transport sector, these developments also generate new problems and thus require a better mapping and understanding of the emerging challenges. In particular, most notable opportunities arise in the domain of sophisticated mobility and navigation systems that can benefit businesses, increase passenger safety and reduce traffic, the increased use of FOT and NDS, or the "integration of cross modal, multi-modal and synchro-modal transport operations" (Kovacikova et. Al, 2018: 25). However, all of the above still depend on the reuse of transport-related data which in turn require several development and common guidelines to be established which would allow overcoming a list of barriers, such as (many of the topics mentioned here are discussed in detail in D4.1):

- **Data Silos:** Fragmentation of how and where data is stored and circulated.
- **Intellectual Property Rights (IPR):** Depending on the actor that collects, handles and shares data, the property rights and related authority vary.
- **Commercial data:** Potential exposure of trade secrets that may harm the interests of private business or entrepreneurs creates the need for having clear negotiation and partnership agreement frameworks and practices on the field.
- **Legal frameworks:** Existing privacy laws highlight certain privacy issues that require attention, especially around sensitive data^{26,27} (health data, religion-related data etc.) that might expose personal sensitive information or misleading research results.
- **Standards and experts:** EU still has deficits regarding common standards on how data overall is to be collected, thus leading to fragmentation of how data is gathered and hindering its potential reuse. In addition, the EU needs evermore experts that follow and develop their research along those lines in order to successfully support any Open Access endeavour.
- **Data quality:** The integrity of the data collected declines due to the variables and hindrances listed here, as well as the potential incorporation of insufficient infrastructure, sensors or storage methodologies.
- **Data Sensitivity and Data control:** Some of the data might concern information that should be protected from unauthorized access or disclosure due to its sensitive nature and the governance and management of those data may raise concerns.
- **Different stakeholders:** Both public institutions and private corporations are involved in the administration, manufacturing and maintenance of transport networks, and all these entities have different data output and data processing methodologies, as well as interests, which creates several barriers that need to be resolved.

²⁶ <https://gdpr-info.eu/art-9-gdpr/> (last accessed on 21/10/2020)

²⁷ <https://gdpr-info.eu/art-10-gdpr/> (last accessed on 21/10/2020)

3.3 Ways forward in Open Access

In conclusion, despite the several challenges in the field of Open Access in Transport overall, guidelines and initiatives on how to go beyond the technical challenges are developed and tested from various actors. However, since the need is to coordinate more efficiently in a cross-disciplinary landscape, what is of utmost importance for a successful initiative which tries to contribute towards Open Access Transport efforts is the ability to share compatible and usable data via an international data sharing platform which overcomes the current barriers and incompatibility issues and manages to develop a sustainable business model around it. So far there are many approaches regarding data support, since there are “as many operational models for open data platforms as there are platforms” (OECD, 2017). The list includes Public-governmental platforms, specific-domain focused platforms, multiple domain platforms, research-oriented platforms and several more all of which have their advantages and disadvantages, however they all seem to have the capacity of operationalising an open transport data management framework (Kovacikova et. Al, 2018: 21), and there are several opportunities and incentives for fruitful developments towards this direction.

The European Open Science Cloud (EOSC) executive board issued a report analysis of the state of FAIR practices throughout diverse research communities and concluded on the following recommendations on how to make data Findable, Accessible, Interoperable and Reusable (FAIR), and turn FAIR into practice:

- **Fund awareness-raising, training, education and community-specific support** – the heterogeneity of the communities involved in research may lead to examples where solutions that work and are optimal for a specific community is not a key driver for another. Raising awareness using community-specific arguments is needed at all levels and such efforts have to be funded.
- **Fund development, adoption and maintenance of community standards, tools and infrastructure** - this is a fundamental step towards the adoption of FAIR principles into practice, a step which requires both commitment and time. To ensure that all communities have equal reach and access to the dedicated resources needed for the realisation of this step, appropriate and sustainable funding of the required resources and effort should be encouraged.
- **Incentivise development of community governance** – community governance is needed for a community to accept and implement FAIR standards. Financial incentives are proposed as means to achieve this goal.
- **Translate FAIR guidelines for other digital objects** – this recommendation refers mostly to needs of non-data digital research objects.
- **Reward and recognise improvements of FAIR practice** – as mentioned above, efforts to improve community FAIR practices require dedication and are time consuming. Unfortunately, such efforts often tend to go unnoticed. It is of great importance to incentivise and reward such efforts to enable the transition to Open Science.
- **Develop and monitor adequate policies for FAIR data and research objects** – policies provide guidance, consistency, accountability, efficiency, and clarity on how



to operate within a specific framework. It is essential that bottom-up, community-based efforts are coupled with top-down, policy-driven approaches.

4 Survey questionnaire on implementing Open Access in transport research

This section will analyse and display the results of the questionnaire survey. The questionnaire itself can be found in the Annex section at the end of this document.

4.1 Methodology

The goal of the research answered in this section is to explore the business models of the participating companies and use them to help raise awareness on actors and relevant stakeholders of transport research into business models involving Open Data. To do this we not only need to understand how the businesses operate but also how they compare to existing classifications of business models using Open Data, allowing us to test these existing models against real-world examples of businesses enabling Open Access.

In order to gain this understanding, we chose to develop a survey based on the existing literature exploring business models and specifically business models involving Open Data. This short survey was then distributed amongst BE OPEN partners and their network of relevant actors in transport and transport research, resulting in a high response rate. The results were then analysed under the scope of understanding how the companies operate and how this compares to other companies and existing research findings.

4.2 Questionnaire design

Based on the literature review findings, we used many of the aforementioned frameworks to help break down the key areas of interest, to better inform the design of the questions in the survey. We used the building blocks identified in the Business Model Canvas (key activities, customer segments, revenue streams etc.) into multiple choice categorical questions which would be both simple to answer and provide useful results for the analysis needed. This way we could ensure that we could return a high response rate by keeping the survey short - we also used branching logic to minimise the number of irrelevant questions each respondent saw wherever possible. We also wanted to be able to quantify the responses to traditionally qualitative questions so that we could analyse the results without introducing significant bias from categorisation of answers. We also made the decision to focus part of the survey to uncover more on the 'freemium model' which appears most often in existing research. A full list of questions and response categories is provided in Annex. The survey was explicitly designed to be applicable and adaptable outside the BE OPEN project, so that it could be reused on a greater scale to look at the wider Open Data ecosystem in future research, respectfully contributing at the same time to Open Science.

4.3 Distribution and Analysis

The survey was first distributed amongst the partners involved in T4.3 and then, after it was agreed upon, to all BE OPEN partners involved in transport research. In turn, research organisations and associations within BE OPEN reached out to their individual network and shared the questionnaire in a total of 53 organisations. This resulted in receiving 43 valid responses for analysis, achieving an 84% response rate.

The results were analysed using Google Sheets and 'R'²⁸ statistical language and environment. Given the scope of the survey, after initial (exploratory) analysis we decided to focus our analysis on the questions most pertinent to exploring the core business model structure, as opposed to those going into great depth on the role of open data and/or nature of the *freemium* model. We decided on reporting only descriptive statistics for the questions we focused on, as, regardless of our very high response rate, the sample size was deemed too small to do any significant segmentation or other analysis.

Because of the constraints placed on the analysis and with the aim of stimulating further research, companies were able to opt into releasing their answers as open data with their

Do you grant us permission to release your responses to this survey in Open Access?

43 responses

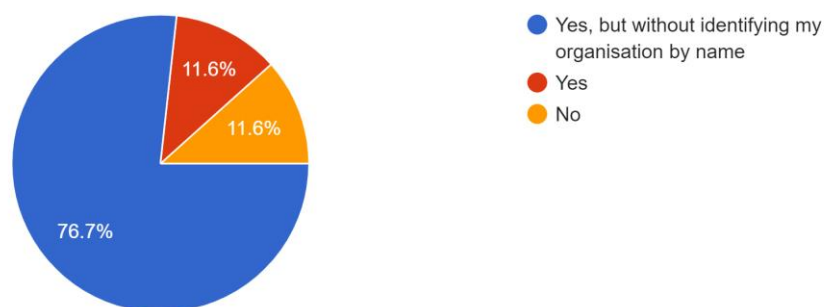


Figure 6: Percentage of the responses in question 31.

company either identified or not. In the chart below, we see an overview of the answers.

As seen in the chart above, only 11,6% (5/43 respondents) opted out of the release of their responses. However, the respondents were also given the ability to choose whether they wish to have their organisation identified by name or not regarding the release of the responses in Open Access and 11,6% (5/43 respondents) agreed on the identification of their organisation by name. But, since 76,7% (33/43 respondents) wished for their organisation to remain unnamed, we will not report any explicit example of the participating organisations.

²⁸ The R Project for Statistical Computing <https://www.r-project.org/> last accessed on 21/10/2020.

5 Survey results

In this section, we report the results of the Open Access business model survey. We provide an overview of responses to subsections of the questions asked. These subsections were chosen on the basis described in the survey analysis section of the methodology, in order to focus the analysis more explicitly on the respondents' business models. The results presented below deal with each of these questions individually.

5.1 Organisation information

An important part of how businesses operate depends on the context of the industry they identify themselves as being a part of. Using the question “Which of the following areas best describes your organisation’s area of expertise/involvement?” we aim to surface this factor which provides context to the overall business model adopted.

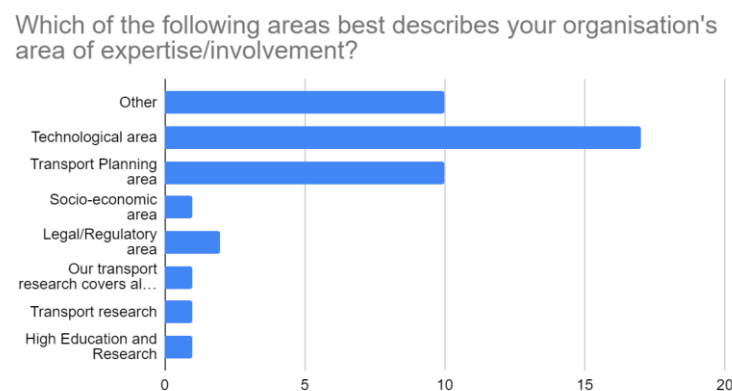


Figure 7: Count of the responses in question 6, per area

Almost 40% of the respondents describe their area of interest as “Technological” (39.5%). Only two other options claim above 5%; “Transport Planning” (23.3%) and “Other” (31.2%) which, unfortunately in most of the cases, was not further specified. “Business Modelling” and “Environmental” were the two areas that were not represented at all.

Area	Count	Percentage
Business Modelling	0	0%
Environmental	0	0%
Legal/Regulatory	2	4.7%
Socio-economical	1	2.3%
Technological	17	39.5%
Transport Planning	10	23.3%
Other	13	31.2%
“Which of the following areas best describes your organisation’s area of expertise/involvement?”		

Table 1: Overview of the responses in question 6.

5.2 Products and services

Has your organisation developed any product(s)/service(s) utilising Open Data?

43 responses

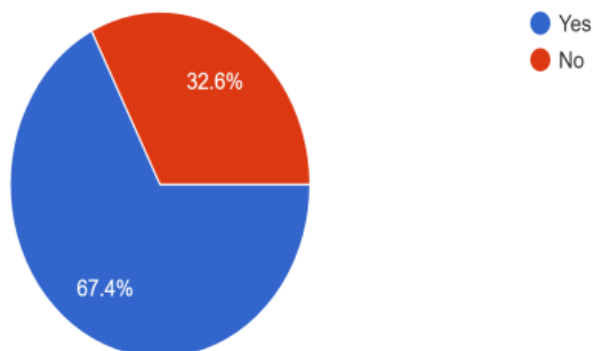


Figure 8: Percentage of the responses in question 7.

If yes, which of the following products/services best describes the outcome(s) of your organisation?

29 responses

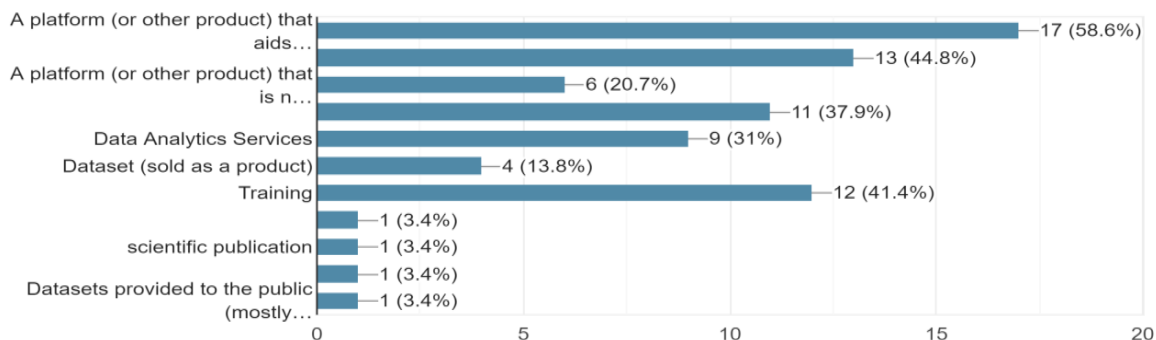


Figure 9: Count and percentage of the responses in question 8, per different service/product

A core part of business models are the products and services offered by a particular company. We are particularly interested in the products or services developed through the utilisation of Open Access data. So, first we asked “*Has your organisation developed any product(s)/service(s) utilising Open Data?*” and received a positive answer on 67.4% of the cases (29/43 respondents), whom we then asked “*If yes, which of the following products/services best describes the outcome(s) of your organisation?*”, to understand the nature of the products and services on offer to enable us to analyse how these fit into the overall business model adopted.

Product/Service	Count	Percentage
A platform (or other product) that aids analysis, visualisation and interpretation of customer-related data	17	58.6%
A platform (or other product) that aids the management of customer-related data (CRM etc.)	13	44.8%
A platform (or other product) that is not data-related	6	20.7%
Consulting	11	37.9%
Data Analytics Services	9	31%
Dataset (sold as a product)	4	13.8%
Training	12	41.4%
Other	5	17%
L Datasets provided to the public (mostly for free)	2	2.8%
L Scientific publication	2	2.8%
L Modelling and Prediction models	1	1.4%
<i>"Which of the following products/services best describes the outcome(s) of your organisation?"</i>		

Table 2: Overview of the responses in question 8.

Almost two thirds of the respondents have developed a “platform (or other product) that aids analysis, visualisation and interpretation of customer-related data” (58.6%). Just over two fifths have developed a proposition which “aids the management of customer-related data (CRM etc.)” (44.8%) and/or developed “training” material (41.4%). In addition, almost one third of them developed “Consulting” (37.9%) and “Data Analytics” (31%). Just over a fifth of the respondents developed a “platform (or other product) that is not data related” (20.7%) and 13.8% sell “dataset as a product”. Five of the respondents (17.3%) answered “other” and clarified their answers in the following way: **i)** two of them are producing “datasets provided to the public (mostly for free)” (2.8%); **ii)** two of them have produced “scientific publication(s)” (2.8%); and **iii)** one of them developed “Modelling and Prediction models” (1.4%).

5.3 Targeted Market and Customers

Another key aspect of business models, highlighted in the literature review are the customers and industries that businesses are targeting. Using the questions:

- i)** “Which of the following areas does your organisation target?” (question 9);
- ii)** “What is the customer type your organisation is targeting?” (question 10);
- iii)** “What kind of organisations does your organisation target?” (question 11); and
- iv)** “What kind of individuals does your organisation target?” (question 12);

we aim at identifying the types of organisations and customers targeted by the respondents’ organisations.

Which of the following areas does your organisation target?

43 responses

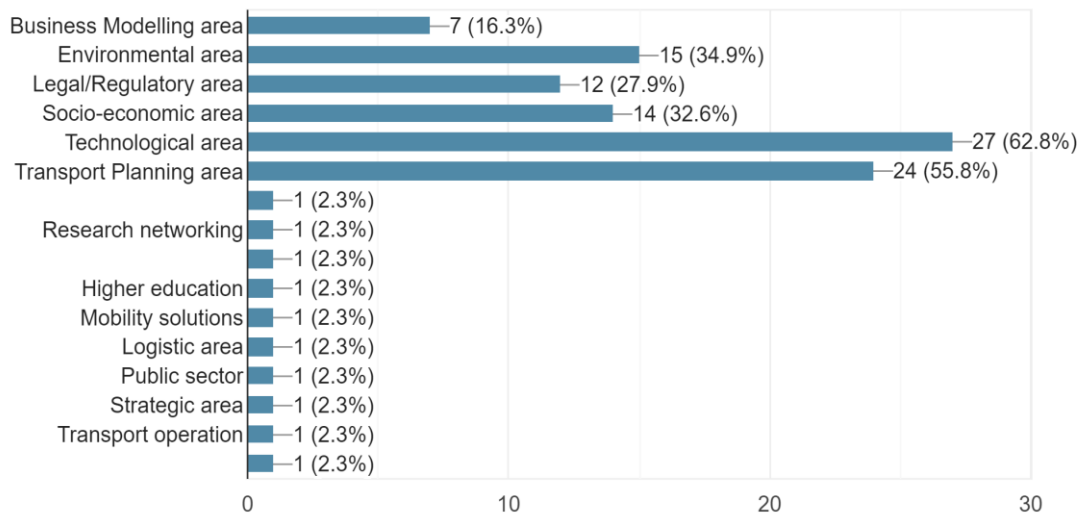


Figure 10: Count and percentage of the responses in question 9.

After analysing the further explanation of the “Other” responses, we re-grouped them as shown in the following table:

Targeted area	Count	Percentage
Business Modelling	7	16.3%
Environmental	16	37.2%
Legal/Regulatory	12	27.9%
Socio-economic	16	37.2%
Technological	27	62.8%
Transport Planning	27	62.8%
Other	4	9.5%
“Which of the following areas does your organisation target?”		

Table 3: Overview of responses in question 9, after re-grouping the answers per area

Unsurprisingly, almost two thirds of the respondents are targeting the “technological” and “transport planning area” (62.8% for both cases). Following with nearly two fifths of the responses are the “environmental” and “socio-economic area” (37.2% each). More than a quarter of the respondents are targeting the “legal/regulatory” area (27.9%), followed by the “business modelling” area (16.3%) and “other” (9.5%).



D4.3: New business models to implement Open Access in transport research

In the question “*What is the customer type your organisation is targeting?*” (Question 10), 21 of the respondents answered “both organisation and individual” (48.8%), 20 answered “organisation” (46.5%) and only 2 answered “individual” (4.7%).

What is the customer type your organisation is targeting?

43 responses

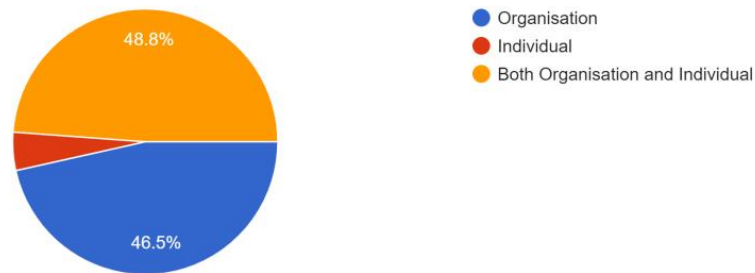


Figure 11: Percentage of the responses in question 10.

What kind of organisations does your organisation target?

41 responses

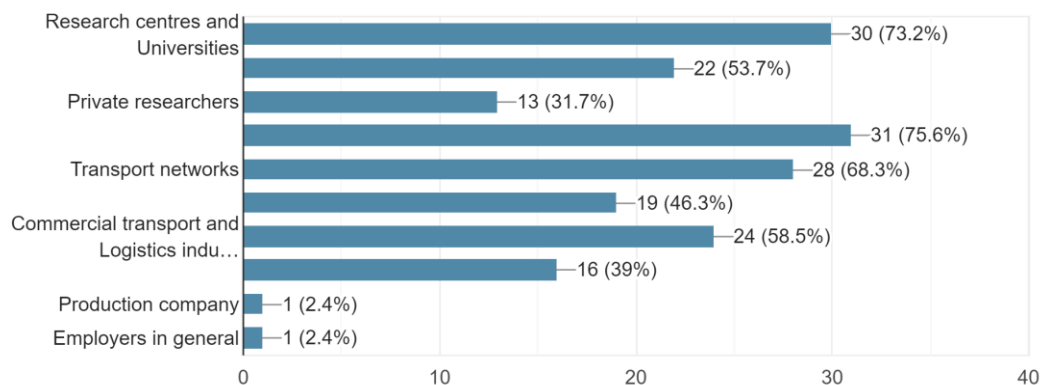


Figure 12: Count and percentage of the responses in question 11, per kind of targeted organisation

Organisation type	Count	Percentage
Research centres and Universities	30	73.2%
Researchers and Students	22	53.7%
Private researchers	13	31.7%
Policy makers (regional/national/international)	31	75.6%
Transport networks	28	68.3%
NGOs and Community organisations	19	46.3%
Commercial transport and Logistics industry players	24	58.5%
Other	2	4.8%
<i>"What kind of organisation does your organisation target?"</i>		

Table 4: Overview of the responses in question 11.

More than three quarters of the respondents targeting organisations, are targeting “policy makers” (75.6%), followed closely by “research centres and universities” (73.2%). More than two thirds responded that they are targeting “transport networks” (68.3%) and close to three out of five answers were “commercial transport and logistics industry players” (58.5%), followed by “researchers and students” (53.7%) with slightly above half of the answers. “NGOs and community organisations” (46.3%) are slightly below half of the answers and the least preferred kind were the “private researchers” (31.7%).

What kind of individuals does your organisation target?

34 responses

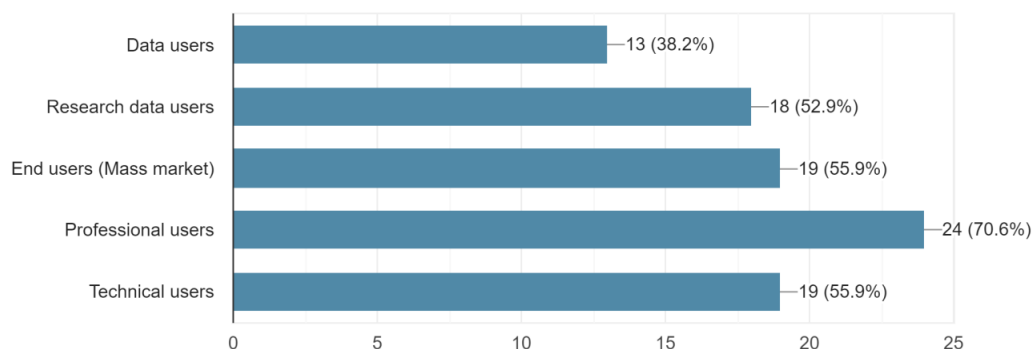


Figure 13: Count and percentage of the responses in question 12, per kind of individual.

More than three quarters of the respondents targeting organisations, are targeting “policy makers” (75.6%), followed closely by “research centres and universities” (73.2%). More than two thirds responded that they are targeting “transport networks” (68.3%) and close to three out of five answers were “commercial transport and logistics industry players” (58.5%), followed by “researchers and students” (53.7%) with slightly above half of the answers. “NGOs and community organisations” (46.3%) are slightly below half of the answers and the least preferred kind were the “private researchers” (31.7%).

The majority of the respondents are targeting “professional users” (70.6%), followed by “end users (mass market)”, “technical users” (55.9% in both cases) and “research data users” (52.9%). The least preferred option is the “data users” gathering slightly less than two fifths of the responses (38.2%).

5.4 Pricing - Revenue stream

The means for deriving revenue from products and services are incredibly important for understanding how a business functions. Using the questions “How does your organisation generate revenue from your product(s)/service(s)?” (Question 13) and “Can your organisation's product(s)/service(s) be used free of charge?” (Question 14), we aim to understand the revenue structures of the participating in the survey organisations and the role they take in supporting the business models adopted.

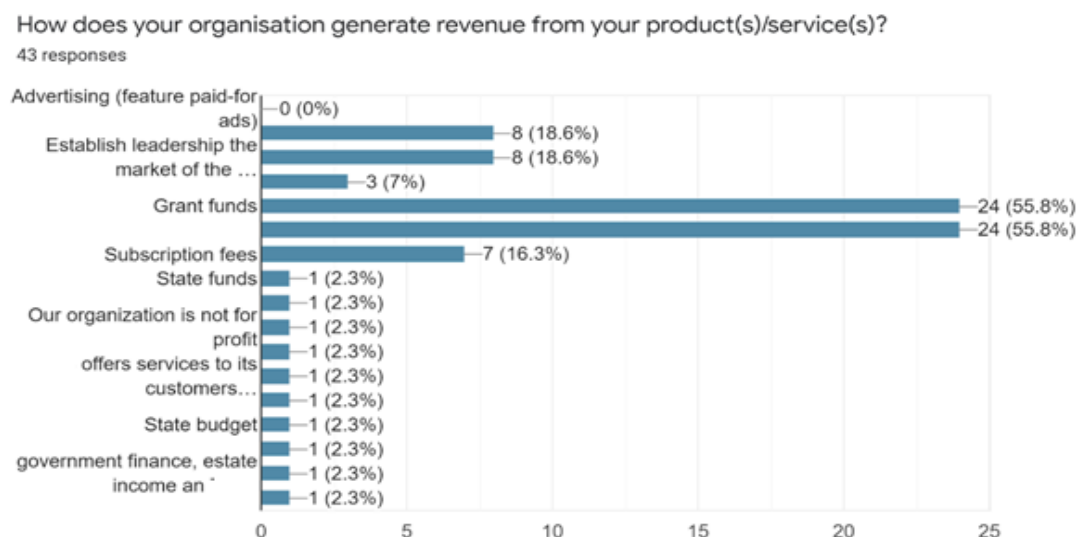


Figure 14: Count and percentage of the responses in question 13.

After analysing the answers provided as explanation in the response “other” we re-grouped the findings as seen below:

Revenue stream	Count	Percentage
Advertising (feature paid-for ads)	0	0%
Attract customers to other (extended) product(s)/service(s) that are not free of charge	8	18.6%
Establish leadership the market of the product(s)/service(s) that your organisation is offering	8	18.6%
Donation funds	6	13.9%
Grant funds	28	65.1%
Payment for the provided product(s)/service(s)	25	58.1%
Subscription fees	7	16.3%
Other	2	4.6%
<i>"How does your organisation generate revenue from your product(s)/service(s)?"</i>		

Table 5: Overview of the responses in question 13, after re-grouping the responses

The vast majority of the respondents (65.1%) are generating revenue through “grants and funds”, followed closely by receiving “payment for the provided product(s)/service(s)” (58.1%). “Attracting customers to other paid products” and “establishing leadership in the market” are both the options of 18.6% of the respondents, followed by “subscription fees” (16.3%) and “donation funds” (13.9%). Two of the respondents (4.6%) answered that they are non-profit organisations.

Can your organisation's product(s)/service(s) be used free of charge?

43 responses

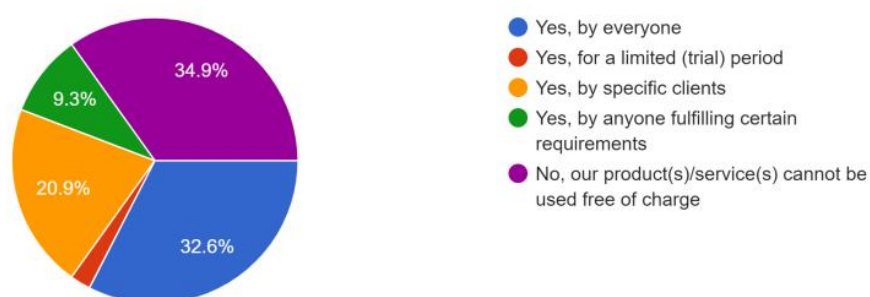


Figure 15: Percentage of the responses in question 14.

Out of the 43 participating organisations, only 34.9% (15/43 respondents) stated that their product/service can be used free of charge. The remaining 65.1% that are providing their product/service free of charge are divided as follows: **i)** 32.6% are offering their product/service for free to everyone; **ii)** 20.9% are offering their product/service for free to specific clients; **iii)** 9.3% are offering their product/service for free to anyone fulfilling certain requirements; and **iv)** just one of the respondents (2.3%) are offering their product/service for free for a limited (trial) period.

5.5 Use of Open Access data

The role Open Access data play is perhaps the most important for understanding how business models involving open data function in practice. Using the questions:

- i) "How much do you agree with the following statement?" "Open Access data play an important role in our organisation" (question 17);
- ii) "Does your organisation make use of Open Access data?" (question 18);
- iii) "How much do you agree with the following statement?" "Publishing Open Access data is very important for our organisation" (question 22);
- iv) "Does your organisation publish Open Access data?" (question 23);
- v) "How much do you agree with the following statement?" "Providing support to other organisations/individuals to publish Open Access data is very important for our organisation" (question 26); and
- vi) "Does your organisation provide support to other organisation(s)/individual(s) for publishing Open Access data?" (question 27);

we aim at observing exactly how Open Access data influences the business models adopted by the respondents.

How much do you agree with the following statement? "Open Access data play an important role in our organisation"

43 responses

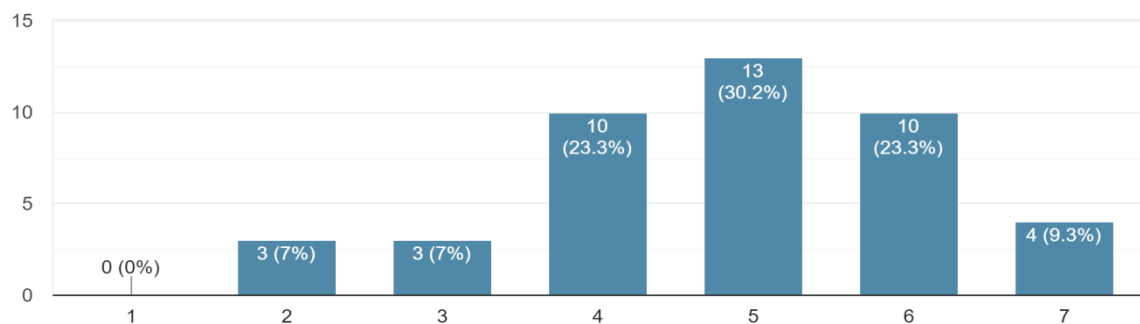


Figure 17: Count and percentage of the responses in question 17.

Does your organisation make use of Open Access data?

43 responses

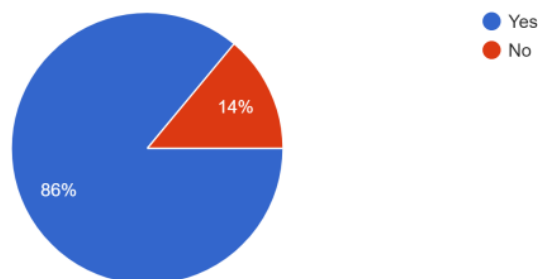


Figure 16: Percentage of the responses in question 18.



D4.3: New business models to implement Open Access in transport research

When asked to state how much they agree with the statement “*Open Access data play an important role in our organisation*” in a 1-7 Likert scale, with 1 standing for “totally disagree” and 7 “totally agree” the response can be summarised as follows: **i)** 32.6% have a strongly positive opinion on the importance of Open Access data; **ii)** the majority of the respondents (60.5%) have a somehow neutral opinion regarding the importance of Open Access data with half of them (30.2%) leaning towards a positive opinion; and **iii)** 7% of the respondents are not in agreement with the statement, but we should mention that none of the respondents totally disagreed. Additionally, when asked “*Does your organisation make use of Open Access data?*”, 37 out of the 43 respondents stated that they are making use of Open Access data (86%) and only 6 out of the 43 respondents (14%) gave a negative answer.

How much do you agree with the following statement? “Publishing Open Access data is very important for our organisation”

43 responses

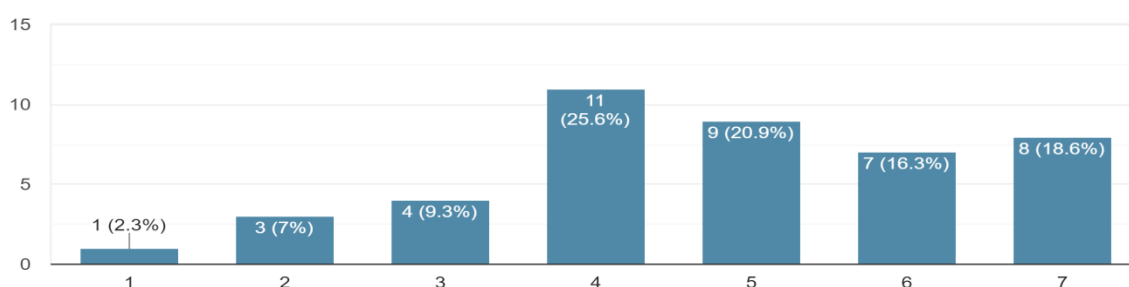


Figure 18: Count and percentage of the responses in question 22.

Does your organisation publish Open Access data?

43 responses

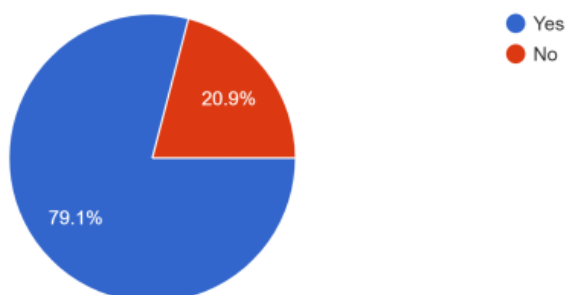


Figure 19: Percentage of the responses in question 23.

When asked to state how much they agree with the statement “*Publishing Open Access data is very important for our organisation*” in a 1-7 Likert scale, with 1 standing for “totally disagree” and 7 “totally agree” the response can be summarised as follows: **i)** 34.9% have a strongly positive opinion on the importance of publishing Open Access data; **ii)** the majority of the respondents (55.8%) have a somehow neutral opinion regarding the importance of publishing Open Access data with more than one third of them (30.2% out of total) leaning towards a positive opinion; and **iii)** only 9.3% of the respondents are not in agreement with the statement. Additionally, when asked “*Does your organisation publish Open Access data?*”, 34 out of the 43 respondents stated that they are publishing Open Access data (79.1%) and only 9 out of the 43 respondents (20.9%) gave a negative answer.

How much do you agree with the following statement? "Providing support to other organisations/individuals to publish Open Access data is very important for our organisation"
43 responses

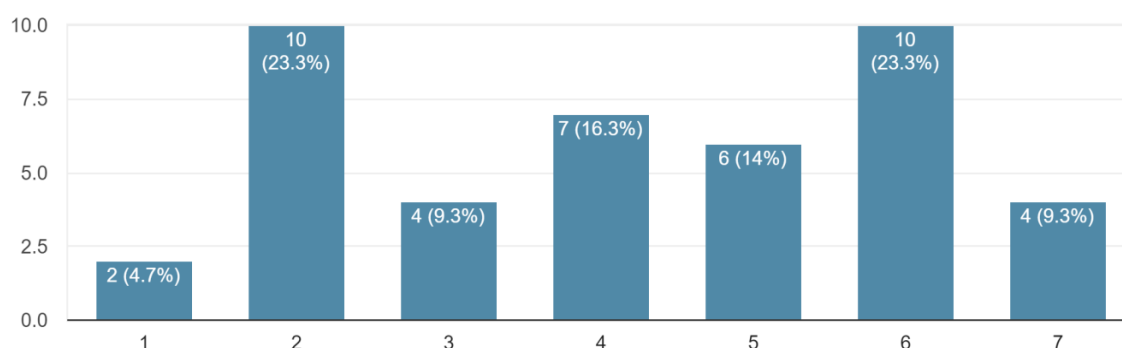


Figure 20: Count and percentage of the responses in question 26.

Does your organisation provide support to other organisation(s)/individual(s) for publishing Open Access data?
43 responses

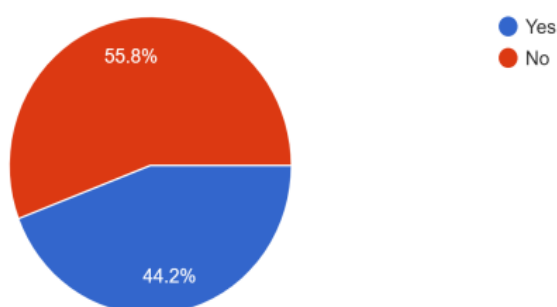


Figure 21: Percentage of the responses in question 27.



When asked to state how much they agree with the statement *“Providing support to other organisations/individuals to publish Open Access data is very important for our organisation”* in a 1-7 Likert scale, with 1 standing for “totally disagree” and 7 “totally agree” the response can be summarised as follows: **i)** 32.6% have a strongly positive opinion on the importance of Open Access data; **ii)** 39.6% have a somehow neutral opinion regarding the importance of Open Access data with one third of them (14% out of the total) leaning towards a positive opinion; and **iii)** 28% of the respondents are not in agreement with the statement, but we should mention that only a small fragment of the respondents (4.7%) totally disagreed. Additionally, when asked *“Does your organisation provide support to other organisation(s)/individual(s) for publishing Open Access data?”*, 19 out of the 43 respondents stated that they are providing support (44.2%) and the majority (55.8%) gave a negative answer.

6 Analysis of the findings

In this section, we shall use the survey results to try and determine the role of Open Access in the participant businesses and its effect, if any, on the business models they have adopted. The main challenge faced by all businesses, even more the early stage ones, is sustainability. In many cases, this challenge involves finding and implementing a successful business model. While for many this can be a significant challenge they are often able to draw upon and iterate on a number of existing models, which have been tested and used many times before.

However, businesses that are centred on open data may experience this challenge to a greater extent than others. Since the idea of Open Access is to make access to data as accessible and available as possible, deriving sustainable revenue from the engaged activities can be quite difficult. As such businesses involving Open Data must experiment to a certain extent to discern the types of business models that are most effective and relevant.

To understand the frameworks being used we must first examine the role of Open Access in their proposition. Once we have understood the role open data plays, we look into the products and services they are providing and importantly the revenue models they are adopting to make these products sustainable. Finally, we investigate the customer segments they are targeting.

6.1 The importance of Open Access

The first question that must be asked of any business relying on Open Data is how important Open Access actually is to their operation. The results of the question *“How much do you agree with the following statement? “Open Access data play an important role in our organisation”* examine how important Open Access data is to each of the businesses and are split in three distinct patterns on the subject.

- I. Close to one third of the respondents (32.6%) claim that Open Access data are very important for their organisation, something that could suggest that most of these organisations are likely to have started with the intention of exploiting whatever value available in Open Access data, or, ever since their first interaction with Open Access data have become heavily reliant on them.

- II. More than half of the respondents (56.5%) remain neutral towards the importance of Open Access data for their organisation, which indicates reliance on open data. While they believe they could exist without Open Access data, it is likely that such models would then rely on data still being shared, but not under an open licence. It could also mean that these businesses are capturing value or building additional features using Open Access data that are not core to the value proposition but greatly enhance their overall offering.
- III. The rest of respondents (7%) stated that Open Access data does not play an important role in their organisation. One possible explanation is that these organisations have an already established proposition and business model that does not rely on Open Access data. Such businesses might be experimenting with open data to enhance their existing products or services.

From the analysis above, it is clear that engaging with Open Access data is seen as either a core facet of the business or one which provides additional value to the organisation. By integrating open data into their products or services they hope to build more competitive offerings to take to the market.

6.2 The use of Open Access data

To understand the operation of organisations engaging Open Access, the first thing to do is to recognise the role that Open Access data plays in that organisation. From the literature review, three current role archetypes have emerged in the open data ecosystem: *publishing Open Access data*, *using Open Access data* and *supporting others to publish Open Access data* (Thomson Reuters, 2014; World Wide Web Foundation, 2015). In our research we wanted to examine how different businesses might be engaging with Open Access data through each of these three roles i) use of Open Access data; ii) publish Open Access Data; and iii) provide support to others towards the publishing of Open Access data.

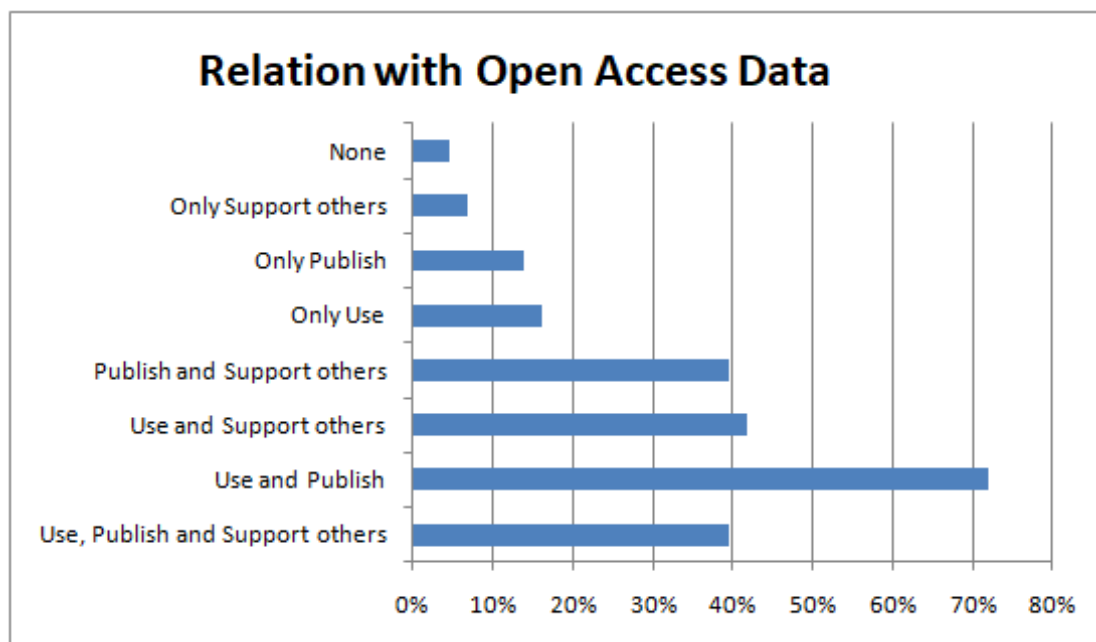


Figure 22: Percentage of the respondents' role in relation with Open Access data



D4.3: New business models to implement Open Access in transport research

From the 43 respondents, only two of them (4.7%) neither use, nor publish Open Access data or provide support to others, whereas almost two out of five respondent organisations (39.5%) use and publish Open Access data, as well as provide support to others towards publishing Open Access data. The same percentage of respondents (39.5%) both publishes Open Access data and provides support to others. Slightly above that with 41.9% of the responses, are the organisations that both use Open Access data and provide support to others, whereas the majority of the organisations (72.1%) both use and publish Open Access data. 37.2% of the organisations only assume one role, differentiating from the traditional understanding that businesses tend to only perform in one of these roles. 16.3% is only using data and, while this role is typically assumed to be the most clear cut in terms of business case - ingesting open data and not publishing - it is interesting that it is noticeably lower than all those who use and carry out another role as well. 14% are only publishing Open Access data, a potential indicator of the fact that while the majority of the organisations (79.1%) are publishing Open Access data, they have yet to build business models, which create and release Open Access data without drawing open data in themselves or helping others to publish. and the remaining 7% only provide support to others towards publishing Open Access data.

What can clearly be stated from the findings presented above is that the three roles the organisations might take with respect to Open Access data often overlap. This indicates that the role of open data in business models is not as clear cut as it might have been perceived by what some of the previous research suggests. Unfortunately, given the small sample size, we were unable to segment the result of the other questions by these categories in an attempt to classify each of these roles, but the opportunity still stands for a wider-reaching research into this area, potentially adopting a similar methodology.

6.3 Products and Services through Open Access

Value proposition is one of the most important building blocks of the Business Model Canvas. A business involving Open Access data needs to find a way to shape their products and services in the most profitable way. Our survey discloses that products using Open Access data are the most common between our respondents. Indeed, 58.6% of them offer a “platform (or other product) that aids analysis, visualisation and interpretation of customer-related data” and 44.8% “A platform (or other product) that aids the management of customer-related data (CRM etc.)”. 41.4% “training”, 37.9% “consulting” and 31% “data analytics services”. This means the organisations see more business opportunities emerging by exploiting Open Access data and creating services around it, than by publishing or supporting. According to the new established ecosystem, offering services using Open Access data would make them sit between the open data publishers and the end users. Consequently, they are intermediaries. This makes “using”, “supporting” and “publishing”, the three main products and services created with Open Access data; and according to their relationship with open data, they are either a core, key or marginal ingredient to the business value proposition. The results of the survey show that a high percentage of organisations use Open Access data to generate insights and provide analysis, the majority (62.2%) see it as a key ingredient that powers their organisation’s main features.

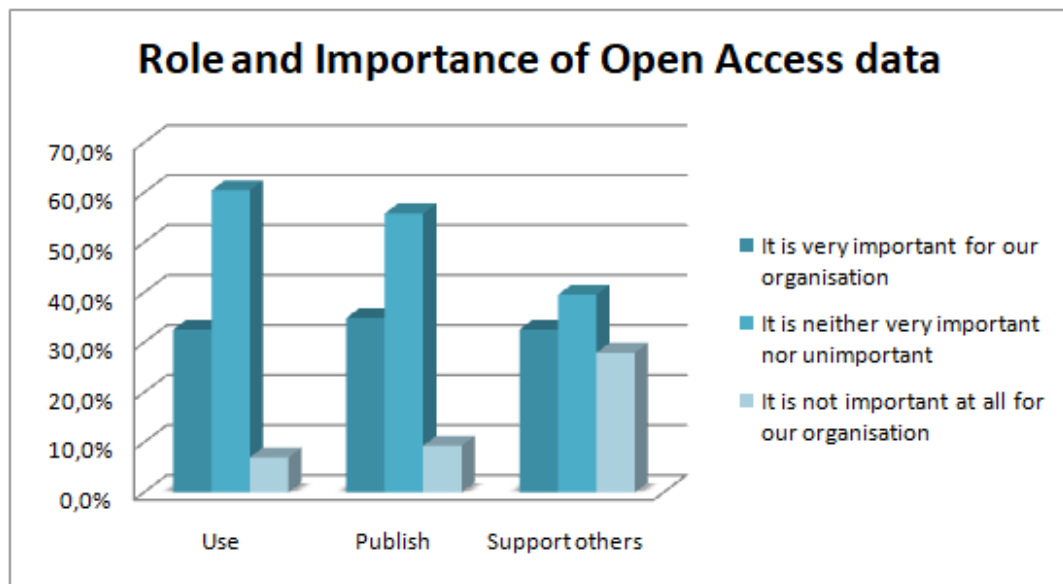


Figure 23: Percentage of the importance of each Open Access data related role based on the respondents' answers

Role	Importance of Open Access data	Count	Percentage
Use	It is very important for our organisation	14	32.5%
	It is neither very important, nor unimportant	26	60.5%
	It is not important at all for our organisations	3	7%
	Total	43	100%
Publish	It is very important for our organisation	15	34.9%
	It is neither very important, nor unimportant	24	55.8%
	It is not important at all for our organisations	4	9.3%
	Total	43	100%
Support others	It is very important for our organisation	14	32.6%
	It is neither very important, nor unimportant	17	39.5%
	It is not important at all for our organisations	12	27.9%
	Total	43	100%

Table 6: Count and percentage of the importance of each Open Access data related role based on the respondents' answers



Aligned with our findings above, as it shows that the business is a combination of “use” and “support” and each organisation has a different relationship with Open Access data. The business activities using Open Access data make these data a key ingredient and the ones supporting make it a marginal ingredient. However, a large percentage of entities (46.6%) value open data in supporting operations as a key ingredient.

Most of the organisations’ value propositions “use” Open Access data and the majority of them qualify it as a key part to their products and services. Then “publishing” and “supporting others to publish Open Access data” are evenly spread and both see open data as a marginal element to their products and services development. Consequently, we notice that Open Access data is not yet seen as a core piece of business operations. This can be explained by the unfamiliarity with open data as a new resource, thus it affects its reliability and increases risks for businesses that want to use it.

6.4 Open Access revenue streams

Another vital element that keeps a business running is the revenue stream. It was found that 65.1% of the organisations using Open Access data, base their revenue streams on grants and other similar sources of funding (tenders etc) and 58.1% on payments for the provided product/service. The majority using grant funding and one-off payments, might indicate they are selling one-off products whether that takes the form of datasets, software, pieces of data analysis or other non-data related one-off products and are developing products with social or environmental impact they want to get funded by a third party. Relatively low numbers are employing other revenue streams, like “subscription fees” (16.3%) and 13.9% rely on donations. A little bit higher, but still low in comparison to other options, are revenue streams that do not involve direct payment from the user, like “attract customers to other (extended) product(s)/service(s) that are not free of charge” (18.6%), “establish leadership the market of the product(s)/service(s) that your organisation is offering” (18.6%). Both of these indicate they are using models that appear to be a form of cross subsidy or razor and blade models.

These last three models all seem to suggest that some organisations might be providing products/services that are free at the point of use. Indeed, the freemium model has been proposed in much of the literature relating to business models involving open data, especially those connected to publishing Open Access data. Indeed, those operating freemium models would likely use a subscription fee for the paid tiers, as they often use as-a-service models of access. In response to the question *“Can your organisation’s product(s)/service(s) be used free of charge?”*, the organisations stated whether their products were ever free at the point of use. Of those who replied ‘yes’ only four of the answers (9.3%) indicated freemium models, as limited trials are not usually considered freemium neither are those which are always free and derive revenue by other means.

Freemium	<i>"Can your organisation's product(s)/service(s) be used free of charge?"</i>	Count	Percentage
Yes	Yes, by specific clients	4	9.3%
	Yes, by anyone fulfilling certain requirements	9	20.9%
	Total	13	30.2%
No	No	15	34.9%
	Yes, for a limited (trial) period	1	2.3%
	Yes, by everyone	14	32.6%
	Total	30	69.8%

Figure 24: Count and percentage of the "Freemium"-related responses.

As shown above, over two thirds of respondents were not applying some form of freemium model (69.8%). This seems to indicate a low popularity of the freemium model among the organisations. The freemium model is particularly interesting in the cases where data forms the product or service, indicating that the companies will publish open data at no cost, while potentially introducing paid tiers for high usage or guarantees on uptime or data availability through service level agreements. In addition, these paid tiers might also be dependent on the organisation, for instance where commercial usage is required.

Similarly, for the cases where the organisations are publishing data, the 32.6% of them providing their product or service free of charge for all customers provides an interesting case, which tends to indicate they are employing cross-subsidy models, or perhaps razor and blade models of value adding services on top.

Given our sample size it is difficult to compare the revenue models being employed with the role of open data, namely whether it is used, published or supported. Also, exploration of the exact nature of the freemium criteria is out of scope for this report; however we hope future research will be able to look more closely at the nature of freemium conditions. In its entirety, it appears that a sizable majority of the respondents are providing service-based models, with a very high proportion offering some form of cross-subsidy or razor and blades model.

6.5 Customer segmentation

According to the survey results, slightly less than two fifths of the organisations (39.5%) categorise themselves as part of the "technology" sector. This means that almost four out of ten organisations operate in the data/technology area and that Open Access data in this industry is published, more accessible and more advanced.

Targeted area	Count	Percentage
Business Modelling	7	16.3%
Environmental	16	37.2%
Legal/Regulatory	12	27.9%
Socio-economic	16	37.2%
Technological	27	62.8%
Transport Planning	27	62.8%
Other	4	9.5%
<i>"Which of the following areas does your organisation target?"</i>		

Figure 25: Overview of the count and percentage for each of the targeted areas.

Apart from the area of interest/expertise, the targeted sectors are also important. The survey results indicate smaller gaps between types of the targeted organisations. The majority of our sample of respondents target customers from the "technology" and "transport planning" area (62.8%). More than one third is targeting customers in the "socio-economic" and "environmental" area (37.2%), followed by "legal/regulatory" (27.9%) and "business modelling" (16.3%) area. This demonstrates that there is no particular area that attracts Open Access data, since one company can target multiple industries.

The survey reveals that the vast majority of the respondent organisations sell their products and services to organisations exclusively (46.5%) and to both organisations and individuals (18.8%). This is not a surprise that the targeted organisations make up 95.3% of targeted customers, as selling to businesses is more advantageous. Indeed, for a company to implement new products and services, use them and keep paying for them, means that they create real value and solve problems, which enables businesses to design long-term customer relationships.

Although the private sector takes up a big portion of the targeted audience, we should point out that 73.2% of those selling to organisations answer "research centres and universities", which is promising for academia.

On the other hand, the targeted individuals are made of 70.6% of "professional users", this specialist category of consumers use the end products/services for other purposes. 55.9% are "end users (mass market) end users/mass market, which means that the received data is not being built on afterwards and is directly used as knowledge, and also 55.9% "technical users", a category which uses the products/services in a similar manner to the "professional users".

Given the fact that the level of availability of Open Access data is still different across industries due to its newness and concept of transparency, the area in which open data is widely used is undoubtedly the technology area. This could be explained by the low level of Open Access data availability in other areas than technology.



D4.3: New business models to implement Open Access in transport research

The most targeted customers are businesses and specialists. These findings show that the end products and services are very likely to be used and built on in order to improve aspects of other organisations and individuals, but also create social and environmental impacts. Indeed, some of the main objectives of research scope at choosing and supporting ideas not only with economic, but also social and environmental benefits.

Even though analysis of the respondent organisations has been conducted and conclusions have been drawn, there are some limitations that should be pointed out. Firstly, the research organisations surveyed, were pretty much already working or were keen to work with Open Access data. This means that they were already familiar with the notion and benefits of Open Access. The second limitation is the language barrier, as the language and wording used in the survey, may not have been fully and commonly understood amongst the participants. Since many terms around open data are relatively new or not widely used, the possibility of them not being clearly defined creates the risk that respondents misunderstood some terms and thus misinterpreted the questions negatively affecting the results.



7 Conclusions

Over the course of this deliverable we explored new and emerging business models built around Open Access data. With the help of the business model canvas, we established a questionnaire survey which enabled us to familiarise with the different value propositions and the role of Open Access data, revenue structures and consumers targets. Although the three activities:

- i. Use;
- ii. Publish; and
- iii. Support others to publish

treat their relationship with open data differently; it is difficult, but also rare for businesses to rely only on one role. Unlike traditional perceptions, new business models now suggest a mixture of two or more value propositions.

One of the most commonly seen to be applied value proposition is “Using open data”, but it does not make open data a core ingredient within the organisations’ operations, acting, instead, as a key element in most business models. Supporting others to publish Open Access data is also commonly applied in an organisation, it is seen by the majority of respondents as a key piece to their products/services. For other organisations, the majority says publishing Open Access data plays a somehow important role the least. The findings show that the role of Open Access data within the organisations is not yet clearly defined and it is quite evenly split. Therefore, it may not yet be relevant as no organisation seems to be either fully dependent or fully independent of Open Access data.

The most widely used revenue system is by subscription, and more precisely, a very large number of respondents use Cross-subsidy and Freemium, which seems to be a dominant pricing structure for open data businesses. Regarding targeted customers, organisations and specialists of a wide range of industries are identified as potential users of the respondents’ products and services. Companies and experts can add significant value to the value proposition being offered and profit can be made by selling to further end consumers. Therefore, products and services developed through the utilisation of Open Access data can generate crucial value, applicable in many different areas.

As for future research, we would like to suggest a focused research on businesses where utilising Open Access data is a core ingredient for their products/services and the nature of freemium conditions can be conducted. This would then lead to a better understanding of the type of the businesses, challenges and/or opportunities that open data could be beneficial to, leading to further adoption of Open Access principles and procedures, ultimately enabling researchers and the application of their findings.

I. References – Literature review

- Ahmadi Zeleti, F., Ojo, A., & Curry, E. (2016). Exploring the economic value of open government data. *Government Information Quarterly*, 33(3), 535–551. <http://doi.org/10.1016/j.giq.2016.01.008>
- Björk, B. C. (2012). The hybrid model for open access publication of scholarly articles: A failed experiment? *Journal of the American Society for Information Science and Technology*, 63(8), 1496–1504. <http://doi.org/10.1002/asi.22709>
- Björk, B. C., & Solomon, D. (2012). Open access versus subscription journals: A comparison of scientific impact. *BMC Medicine*, 10, 73. <http://doi.org/10.1186/1741-7015-10-73>
- Bocken, N. M. P., Short, S. W., Rana, P., & Evans, S. (2014, February 15). A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production*. Elsevier. <http://doi.org/10.1016/j.jclepro.2013.11.039>
- Casadesus-Masanell, R., & Ricart, J. E. (2010). From strategy to business models and onto tactics. *Long Range Planning*, 43(2–3), 195–215. <http://doi.org/10.1016/j.lrp.2010.01.004>
- Childs, S., McLeod, J., Lomas, E., & Cook, G. (2014). Opening research data: Issues and opportunities. *Records Management Journal*, 24(2), 142–162. <http://doi.org/10.1108/RMJ-01-2014-0005>
- Clark, T., Osterwalder, A., & Pigneur, Y. (2012). *Business Model You: A One-Page Method For Reinventing Your Career*. Wiley. Retrieved from <https://books.google.gr/books?id=OZIRn1z-pxkC> last accessed on 21/10/2020.
- Conradie, P., & Choenni, S. (2014). On the barriers for local government releasing open data. *Government Information Quarterly*, 31(SUPPL.1). <http://doi.org/10.1016/j.giq.2014.01.003>
- Copiello, S. (2020). Business as usual with article processing charges in the transition towards OA publishing: A case study based on Elsevier. *Publications*, 8(1). <http://doi.org/10.3390/publications8010003>
- Craig, I. D., Plume, A. M., McVeigh, M. E., Pringle, J., & Amin, M. (2007, July). Do open access articles have greater citation impact?. A critical review of the literature. *Journal of Informetrics*. <http://doi.org/10.1016/j.joi.2007.04.001>
- Davis, P. M., & Walters, W. H. (2011). The impact of free access to the scientific literature: A review of recent research. *Journal of the Medical Library Association*, 99(3), 208–217. <http://doi.org/10.3163/1536-5050.99.3.008>
- de Rosnay, M. D., & Janssen, K. (2014). Legal and institutional challenges for opening data across public sectors: Towards common policy solutions. *Journal of Theoretical and Applied Electronic Commerce Research*, 9(3). <http://doi.org/10.4067/S0718-18762014000300002>
- Dehdarirad, T., Freer, J., & Mladenovic, A. (2020). How does media reflect the OA and non-OA scientific literature? A case study of environment sustainability. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture*



D4.3: New business models to implement Open Access in transport research

Notes in Bioinformatics) (Vol. 12051 LNCS, pp. 768–781). Springer.

http://doi.org/10.1007/978-3-030-43687-2_64

Frankenberger, K., Weiblen, T., Csik, M., & Gassmann, O. (2013). The 4I-framework of business model innovation: A structured view on process phases and challenges.

International Journal of Product Development, 18(3–4), 249–273.

<http://doi.org/10.1504/IJPD.2013.055012>

Fruhworth, M., Rachinger, M., & Prlja, E. (2020). Discovering Business Models of Data Marketplaces. In Proceedings of the 53rd Hawaii International Conference on System Sciences. Hawaii International Conference on System Sciences.

<http://doi.org/10.24251/hicss.2020.704>

Green, T. (2019). Is open access affordable? Why current models do not work and why we need internet-era transformation of scholarly communications. *Learned Publishing*, 32(1), 13–25. <http://doi.org/10.1002/leap.1219>

Guéret, C. (2013). Publishing Open Data on the Web. In Pilot Linked Open Data Nederland (Vol. 23). Retrieved from <http://www.pilod.nl/index.php?title=Boek/Gueret-Publish%5Cnhttps://github.com/cgueret/pilod-boek/blob/master/how-to-publish-open-data.md> last accessed on 21/10/2020.

Heck, T., Peters, I., Mazarakis, A., Scherp, A., & Blümel, I. (2020). Open science practices in higher education: Discussion of survey results from research and teaching staff in Germany. *Education for Information*. IOS Press BV. <http://doi.org/10.3233/EFI-190272>

Hossain, M. A., Dwivedi, Y. K., & Rana, N. P. (2016). State-of-the-art in open data research: Insights from existing literature and a research agenda. *Journal of Organizational Computing and Electronic Commerce*, 26(1–2), 14–40. <http://doi.org/10.1080/10919392.2015.1124007>

Howard, A. (2013). Open data economy: Eight business models for open data and insight from Deloitte UK - O'Reilly Radar. *O'Reilly Radar*. Retrieved from <https://www.oreilly.com/content/open-data-business-models-deloitte-insight/> last accessed on 21/10/2020.

Hyland, J., Kouker, A., & Zaitsev, D. (2020). Open Access eXchange (OAeX): an economic model and platform for fundraising open scholarship services. *Insights the UKSG Journal*, 33. <http://doi.org/10.1629/uksg.500>

Immonen, A., Palviainen, M., & Ovaska, E. (2014). Towards open data based business: Survey on usage of open data in digital services. *International Journal of Research in Business and Technology*, 4(1). <http://doi.org/10.17722/ijrbt.v4i1.197>

Jaakkola, H., Mäkinen, T., & Eteläaho, A. (2014). Open data - Opportunities and challenges. In ACM International Conference Proceeding Series (Vol. 883, pp. 25–39). Association for Computing Machinery. <http://doi.org/10.1145/2659532.2659594>

Janssen, M., & Zuiderwijk, A. (2014). Infomediary Business Models for Connecting Open Data Providers and Users. *Social Science Computer Review*, 32(5), 694–711. <http://doi.org/10.1177/0894439314525902>



D4.3: New business models to implement Open Access in transport research

Jetzek, T., Avital, M., & Bjorn-Andersen, N. (2014). Data-driven innovation through open government data. *Journal of Theoretical and Applied Electronic Commerce Research*, 9(2), 100–120. <http://doi.org/10.4067/S0718-18762014000200008>

Johnson, M. W. (2010). A New Framework for Business Models. Retrieved October 21, 2020, from <https://hbr.org/2010/01/is-your-business-model-a-myste-1>

Johnson, M. W., Christensen, C. M., & Kagermann, H. (2008). Reinventing your business model. *Harvard Business Review*, 86(12). Retrieved from <https://hbr.org/2008/12/reinventing-your-business-model> last accessed on 21/10/2020.

Kenton, W. (2019). Razor-Razorblade Model: Overview. Retrieved October 21, 2020, from <https://www.investopedia.com/terms/r/razor-razorblademodel.asp>

Keynote: Commercial Open Source Business Models - Sid Sijbrandij, Co-founder & CEO, GitLab - YouTube. (n.d.). Retrieved October 21, 2020, from https://www.youtube.com/watch?v=G6ZupYzr_Zg

Kitsios, F., Papachristos, N., & Kamariotou, M. (2017). Business models for open data ecosystem: Challenges and motivations for entrepreneurship and innovation. In *Proceedings - 2017 IEEE 19th Conference on Business Informatics, CBI 2017* (Vol. 1, pp. 398–407). Institute of Electrical and Electronics Engineers Inc. <http://doi.org/10.1109/CBI.2017.51>

Kühne, B., & Böhmman, T. (2020). Data-driven business models - Building the bridge between data and value. In *27th European Conference on Information Systems - Information Systems for a Sharing Society, ECIS 2019*. Retrieved from https://aisel.aisnet.org/ecis2019_rp/167 last accessed on 21/10/2020.

Laakso, M., & Björk, B. C. (2012). Anatomy of open access publishing: a study of longitudinal development and internal structure. *BMC Medicine*, 10(1), 1–9. <http://doi.org/10.1186/1741-7015-10-124>

Laakso, M., Welling, P., Bukvova, H., Nyman, L., Björk, B. C., & Hedlund, T. (2011). The development of open access journal publishing from 1993 to 2009. *PLoS ONE*. <http://doi.org/10.1371/journal.pone.0020961>

Lüdeke-Freund, F. (2015). 93. Knowledge Collaboration & Learning for Sustainable Innovation ERSCP-EMSU conference TOWARDS A CONCEPTUAL FRAMEWORK OF BUSINESS MODELS FOR SUSTAINABILITY The 14th European Roundtable on Sustainable Production and Consumption (ERSCP) The 6th Environm. *Papers.Ssrn.Com*, 49, 1–28. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2189922%0Ahttps://www.researchgate.net/publication/256042028%0Ahttps://poseidon01.ssrn.com/delivery.php?ID=4581171060690710801251050931080871180510530510210580430681270661041001140110790931020360540321260540 last accessed on 21/10/2020.

Making Open Science a Reality 2 Organisation for Economic Co-Operation and Development. (2015).

Manenti, F. M., & Comino, S. (2011). Dual Licensing in Open Source Software Markets. *SSRN Electronic Journal*. <http://doi.org/10.2139/ssrn.985529>



D4.3: New business models to implement Open Access in transport research

Mike Olson: Open Source Business Models - YouTube. (n.d.). Retrieved October 21, 2020, from https://www.youtube.com/watch?v=T_UM5PYk9NA

Noda, T., Duan, R., Fukushima, H., Yoshida, A., & Coughlan, S. (2017). The Classification, challenge and potential of business models by using open data. In Proceedings of the 13th International Symposium on Open Collaboration Companion, OpenSym 2017 (pp. 1–3). New York, New York, USA: Association for Computing Machinery, Inc. <http://doi.org/10.1145/3126673.3126674>

Noda, T., Honda, M., Yoshida, A., & Coughlan, S. (2016). Review of estimation method of economic effects created by using open data. In Companion to the Proceedings of the 12th International Symposium on Open Collaboration, OpenSym 2016 (pp. 1–3). New York, New York, USA: ACM Press. <http://doi.org/10.1145/2962132.2962144>

Open Data Institute. (2015). How to make a business case for open data. Retrieved October 21, 2020, from <https://theodi.org/article/how-to-make-a-business-case-for-open-data/>

Opening Science. (2014). Opening Science. Springer International Publishing. <http://doi.org/10.1007/978-3-319-00026-8>

Oskam, I., Bossink, B., & de Man, A. P. (2020). Valuing Value in Innovation Ecosystems: How Cross-Sector Actors Overcome Tensions in Collaborative Sustainable Business Model Development. *Business and Society*, 000765032090714. <http://doi.org/10.1177/0007650320907145>

Ritter, T., & Pedersen, C. L. (2020). Assessing Coronavirus's Impact on Your Business Model. Harvard Business Review, April 15, 2020. Retrieved from <https://hbr.org/2020/04/assessing-coronaviruss-impact-on-your-business-model?ab=hero-main-text> last accessed on 21/10/2020.

Roman, M., Liu, J., & Nyberg, T. (2018). Advancing the open science movement through sustainable business model development. *Industry and Higher Education*, 32(4), 226–234. <http://doi.org/10.1177/0950422218777913>

Shafer, S. M., Smith, H. J., & Linder, J. C. (2005). The power of business models. *Business Horizons*, 48(3), 199–207. <http://doi.org/10.1016/j.bushor.2004.10.014>

Sharma, C., Friman, M., & Jaakola, M. (2020). Applicability of Design System to White-Label Service Development. Retrieved from <https://aaltodoc.aalto.fi:443/handle/123456789/42763> last accessed on 21/10/2020

Sharma, C., Friman, M., & Jaakola, M. (2020). Applicability of Design System to White-Label Service Development. Retrieved from <https://aaltodoc.aalto.fi:443/handle/123456789/42763> last accessed on 21/10/2020.

Smedsrød, B., & Longva, L. (2020). The costly prestige ranking of scholarly journals. *Ravnetrykk*, (39). <http://doi.org/10.7557/15.5507>

Smith, G., Ofe, H. A., & Sandberg, J. (2016). Digital service innovation from open data: exploring the value proposition of an open data marketplace. In *Proceedings of the Annual*



D4.3: New business models to implement Open Access in transport research

Hawaii International Conference on System Sciences (Vol. 2016–March, pp. 1277–1286). IEEE Computer Society. <http://doi.org/10.1109/HICSS.2016.162>

Solomon, D. J., & Björk, B. C. (2012). A study of open access journals using article processing charges. *Journal of the American Society for Information Science and Technology*, 63(8), 1485–1495. <http://doi.org/10.1002/asi.22673>

Stacey, P. (2016). What is an Open Business Model and How Can You Generate Revenue? Retrieved October 21, 2020, from <https://medium.com/made-with-creative-commons/what-is-an-open-business-model-and-how-can-you-generate-revenue-5854d2659b15>

Vetrò, A., Canova, L., Torchiano, M., Minotas, C. O., Iemma, R., & Morando, F. (2016). Open data quality measurement framework: Definition and application to Open Government Data. *Government Information Quarterly*, 33(2), 325–337. <http://doi.org/10.1016/j.giq.2016.02.001>

Vines, T. (2018). Is There a Business Case for Open Data? *Editorial Office News*, 11(10), 9–10. <http://doi.org/10.18243/eon/2018.11.10.4>

Viseur, R. (2015). Open science: Practical issues in open research data. In *DATA 2015 - 4th International Conference on Data Management Technologies and Applications, Proceedings* (pp. 201–206). SciTePress. <http://doi.org/10.5220/0005558802010206>

Welle Donker, F., & Van Loenen, B. (2016). Sustainable Business Models for Public Sector Open Data Providers. *JeDEM - EJournal of EDemocracy and Open Government*, 8(1), 28–61. <http://doi.org/10.29379/jedem.v8i1.390>

Zeleti, F. A., Ojo, A., & Curry, E. (2014). Emerging business models for the open data industry: Characterization and analysis. In *ACM International Conference Proceeding Series* (pp. 215–226). Association for Computing Machinery. <http://doi.org/10.1145/2612733.2612745>

Zuiderwijk, A., Janssen, M., Poulis, K., & Van De Kaa, G. (2015). Open data for competitive advantage: Insights from open data use by companies. In *ACM International Conference Proceeding Series* (Vol. 27-30-May-, pp. 79–88). Association for Computing Machinery. <http://doi.org/10.1145/2757401.2757411>



II. Annex

Open Access Business Model survey - Questionnaire

Personal Information

Your personal details are only collected for the verification of the responders' identity. We will never disclose your personal information to any third party, or use your personal details on any report or deliverable connected to this survey.

* Required

1. Email address *

2. What is your name? *

Information about your organisation

Details about your organisation, product(s)/service(s) of your organisation, and targeted market of your organisation

3. What is the name of your organisation? *

4. How many employees are currently working for your organisation? *

Mark only one oval.

- ☐ 1-9 employee(s) (micro)
☐ 10-49 employees (Small)
☐ 50-250 employees (Medium)
☐ 250+ employees (Large)

5. How could your organisation be described in one sentence?

6. Which of the following areas best describes your organisation's area of expertise/involvement? *

Mark only one oval.

- ☐ Business Modelling area
☐ Environmental area
☐ Legal/Regulatory area
☐ Socio-economic area
☐ Technological area
☐ Transport Planning area
☐ Other:

7. Has your organisation developed any product(s)/service(s) utilising Open Data? *

Mark only one oval.

- ☐ Yes
☐ No

8. If yes, which of the following products/services best describes the outcome(s) of your organisation?

Check all that apply.

- ☐ A platform (or other product) that aids analysis, visualisation and interpretation of customer-related data
☐ A platform (or other product) that aids the management of customer-related data (CRM etc.)
☐ A platform (or other product) that is not data-related
☐ Consulting
☐ Data Analytics Services
☐ Dataset (sold as a product)
☐ Training

Other: ☐



D4.3: New business models to implement Open Access in transport research

9. Which of the following areas does your organisation target? *

What is/are your organisation's area(s) of interest?

Check all that apply.

- ☐ Business Modelling area
- ☐ Environmental area
- ☐ Legal/Regulatory area
- ☐ Socio-economic area
- ☐ Technological area
- ☐ Transport Planning area

Other: ☐ _____

10. What is the customer type your organisation is targeting? *

Mark only one oval.

- ☐ Organisation
- ☐ Individual
- ☐ Both Organisation and Individual

11. What kind of organisations does your organisation target?

If your answer to the previous question ('What is the customer type your organisation is targeting?') was 'Organisation' or 'Both', please answer this question.

Check all that apply.

- ☐ Research centres and Universities
- ☐ Researchers and Students
- ☐ Private researchers
- ☐ Policy makers (regional/national/international)
- ☐ Transport networks
- ☐ NGOs and Community organisations
- ☐ Commercial transport and Logistics industry players
- ☐ Citizens

Other: ☐ _____

12. What kind of individuals does your organisation target?

If your answer to the previous question ('What is the customer type your organisation is targeting?') was 'Organisation' or 'Both', please answer this question.

Check all that apply.

- ☐ Data users
- ☐ Research data users
- ☐ End users (Mass market)
- ☐ Professional users
- ☐ Technical users

Pricing - Revenue stream

This section will provide insights on how revenue is generated from your organisation's product(s)/service(s).

13. How does your organisation generate revenue from your product(s)/service(s)? *

Check all that apply.

- ☐ Advertising (feature paid-for ads)
- ☐ Attract customers to other (extended) product(s)/service(s) that are not free of charge
- ☐ Establish leadership the market of the product(s)/service(s) that your organisation is offering
- ☐ Donation funds
- ☐ Grant funds
- ☐ Payment for the provided product(s)/service(s)
- ☐ Subscription fees

Other: ☐ _____

14. Can your organisation's product(s)/service(s) be used free of charge? *

Mark only one oval.

- ☐ Yes, by everyone
- ☐ Yes, for a limited (trial) period
- ☐ Yes, by specific clients
- ☐ Yes, by anyone fulfilling certain requirements
- ☐ No, our product(s)/service(s) cannot be used free of charge



D4.3: New business models to implement Open Access in transport research

15. Which of the following types of client can use your organisation's product(s)/service(s) free of charge?

If your answer to question 14 ("Can your organisation's product(s)/service(s) be used free of charge?") was "Yes, by specific clients", please answer this question.

Check all that apply.

- ☐ Academia
- ☐ Government
- ☐ Individual user
- ☐ Industry
- ☐ NGO, Non-profit

Other: ☐ _____

16. What are the requirements that a client would have to fulfill in order to use your company's product(s)/service(s) free of charge?

If your answer to question 14 ("Can your organisation's product(s)/service(s) be used free of charge?") was "Yes, by anyone fulfilling certain requirements", please answer this question.

Open Access data use

This section aims at providing insights on the utilisation of Open Access and Open Data as part of your organisation's business model

17. How much do you agree with the following statement? "Open Access data play an important role in our organisation" *

Mark only one oval.

	1	2	3	4	5	6	7	
Totally disagree. Our organisation does not need Open Access data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totally agree. Our organisation would not be able to exist without Open Access data

18. Does your organisation make use of Open Access data? *

Mark only one oval.

- ☐ Yes
- ☐ No Skip to question 22

19. If yes, who is/are the publishing source(s) of the Open Access data your organisation is making use of?

Check all that apply.

- ☐ Academia
- ☐ Government
- ☐ Individuals
- ☐ Industry
- ☐ NGO, Non-profit

20. In which of the following areas does these Open Access data refer to?

If you answered "No" in question 18 "Does your organisation make use of Open Access data?", you may skip this question.

Check all that apply.

- ☐ Business Modelling area
- ☐ Environmental area
- ☐ Legal/Regulatory area
- ☐ Socio-economic area
- ☐ Technological area
- ☐ Transport Planning area

Other: ☐ _____

21. Which of the following data-related procedures (if any) does your organisation perform on the Open Access data utilised?

If you answered "No" in question 18 "Does your organisation make use of Open Access data?", you may skip this question.

Check all that apply.

- ☐ Aggregation
- ☐ Analysis
- ☐ Annotation
- ☐ Anonymisation
- ☐ Cleaning
- ☐ Encryption/Decryption
- ☐ Enrichment
- ☐ Labelling
- ☐ Validation
- ☐ Visualisation

Other: ☐ _____



D4.3: New business models to implement Open Access in transport research

Providing Open Access data

This section aims at providing insights on your organisation's involvement on publishing Open Access data

22. How much do you agree with the following statement? "Publishing Open Access data is very important for our organisation" *

Mark only one oval.

	1	2	3	4	5	6	7	
Totally disagree. Publishing Open Access data is not within the scope of our company's activities whatsoever.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totally agree. Publishing Open Access data is very important for our organisation.

23. Does your organisation publish Open Access data? *

Mark only one oval.

☐ Yes

☐ No Skip to question 26

24. If yes, what is the source of origin of these Open Access data?

Check all that apply.

☐ Data was published with Open Access by others (not users/clients)

☐ Data were generated during internal procedures

☐ Data were generated from the users/clients of our organisation's product(s)/service(s)

Other: ☐ _____

25. In which of the following areas does these Open Access data refer to?

If you answered that your organisation is NOT publishing Open Access data, you may skip this question.

Check all that apply.

☐ Business Modelling area

☐ Environmental area

☐ Legal/Regulatory area

☐ Socio-economic area

☐ Technological area

☐ Transport Planning area

Other: ☐ _____

Supporting others towards publishing Open Access data

This section aims at providing insights on your organisation's involvement on providing support to other organisation(s)/individual(s) towards publishing Open Access data

26. How much do you agree with the following statement? "Providing support to other organisations/individuals to publish Open Access data is very important for our organisation" *

Mark only one oval.

	1	2	3	4	5	6	7	
Totally disagree. Providing support to others for publishing Open Access data is not within the scope of our company's activities whatsoever.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totally agree. Providing support to others for publishing Open Access data is very important for our organisation.

27. Does your organisation provide support to other organisation(s)/individual(s) for publishing Open Access data? *

Mark only one oval.

☐ Yes

☐ No Skip to question 30

28. In what kind of organisation does your organisation provide support for publishing Open Access data?

Check all that apply.

☐ Research centres and Universities

☐ Researchers and Students

☐ Private researchers

☐ Policy makers (regional/national/international)

☐ Transport networks

☐ NGOs and Community organisations

☐ Commercial transport and Logistics industry players

☐ Citizens

Other: ☐ _____



D4.3: New business models to implement Open Access in transport research

29. In which of the following areas does these Open Access data refer to?

If you answered that your organisation is NOT providing support to others for publishing Open Access data, you may skip this question.

Check all that apply.

- ☐ Business Modelling area
- ☐ Environmental area
- ☐ Legal/Regulatory area
- ☐ Socio-economic are
- ☐ Technological area
- ☐ Transport Planning area

Other: ☐ _____

Additional Research

Given the fact that the overall scope of this survey is to find a way to promote Open Access in research, we would like your permission for making the survey results as Open as possible.

30. Do you grant us permission to link your organisation with your responses for this survey?

Mark only one oval.

- ☐ Yes
- ☐ No

31. Do you grant us permission to release your responses to this survey in Open Access?

Mark only one oval.

- ☐ Yes, but without identifying my organisation by name
- ☐ Yes
- ☐ No