

	 <p>Transforming Research through Innovative Practices for Linked Interdisciplinary Exploration</p>
[APRIL 30 2020]	Advancing Open Scholarship
	<h2>D7.1 – Report on Stakeholder- and Opportunity Analysis</h2> <p>Version 1.0 – Final PUBLIC</p>
	H2020-INFRAEOSC-2019 Grant Agreement 863420

The project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 863420

Disclaimer- “The content of this publication is the sole responsibility of the TRIPLE consortium and can in no way be taken to reflect the views of the European Commission. The European Commission is not responsible for any use that may be made of the information it contains.”

This deliverable is licensed under a Creative Commons Attribution 4.0 International License



# D7.1 – REPORT ON STAKEHOLDER- AND OPPORTUNITY ANALYSIS

---

Project Acronym:	<b>TRIPLE</b>
Project Name:	<b>Transforming Research through Innovative Practices for Linked Interdisciplinary Exploration</b>
Grant Agreement No:	<b>863420</b>
Start Date:	<b>1/10/2019</b>
End Date:	<b>31/03/2023</b>
Contributing WP	<b>WP7 Innovation, Exploitation and Sustainability</b>
WP Leader:	<b>Know-Center</b>
Deliverable identifier	<b>D7.1</b>
Contractual Delivery Date: 02/2020	<b>Actual Delivery Date: 04/2020</b>
Nature: Report	<b>Version: 1.0 Final</b>
Dissemination level	<b>PU</b>

## Revision History

Version	Created/Modifier	Comments
0.0	Suzanne Dumouchel CNRS (HN), Emilie Blotiere CNRS (HN), Maxime Bouillard MEOH, Francesca Di Donato Net7, Paula Forbes AU, Carla Barreiros KNOW, Gert Breitfuss KNOW	First draft

0.1	Matti Heikkurinen EGI, Peter Kraker OKMaps, Arnaud Roi DARIAH, Carla Barreiros KNOW, Gert Breitfuss KNOW	1 <sup>st</sup> internal review
0.2	Maxime Bouillard MEOH, Carla Barreiros KNOW, Gert Breitfuss KNOW	2 <sup>nd</sup> internal review
1.0	Suzanne Dumouchel CNRS (HN), Emilie Blotiere CNRS (HN), Carla Barreiros KNOW, Gert Breitfuss KNOW	Final version

# Table of Contents

<b>1 </b>	<b>INTRODUCTION</b>	<b>7</b>
1.1	PLANNING STATUS OF TRIPLE PLATFORM	8
1.2	OBJECTIVES AND STRUCTURE OF THE REPORT	10
<b>2 </b>	<b>STAKEHOLDER ANALYSIS</b>	<b>11</b>
2.1	IDENTIFICATION OF STAKEHOLDER	11
2.2	ANALYSIS OF STAKEHOLDER INFLUENCE	12
2.3	MEASURES FOR STAKEHOLDER MANAGEMENT	13
<b>3 </b>	<b>PESTLE ANALYSIS</b>	<b>15</b>
3.1	POLITICAL	15
3.2	ECONOMICAL	16
3.3	SOCIAL	17
3.4	TECHNICAL	19
3.5	LEGAL	20
3.6	ENVIRONMENTAL	21
3.7	CONCLUSION AND RELEVANCE FOR TRIPLE	21
<b>4 </b>	<b>COMPETITOR ANALYSIS</b>	<b>23</b>
4.1	IDENTIFYING RELEVANT COMPETITORS	23
4.2	ANALYSIS	26
4.2.1	COMPETITORS CHARACTERIZATION	26
4.2.2	USABILITY & UX	27
4.2.3	RELEVANT FUNCTIONS & FEATURES	28
4.2.4	ORGANISATION & FINANCING	33
4.3	CONCLUSION AND RELEVANCE FOR TRIPLE	35
<b>5 </b>	<b>EXPERT INTERVIEWS</b>	<b>36</b>
5.1	INTERVIEW RESULTS: OPEN SCIENCE GENERAL EXPERTS	36
5.2	INTERVIEW RESULTS: OPEN SCIENCE SERVICE PROVIDER	38
5.3	LEARNINGS FOR TRIPLE	39
<b>6 </b>	<b>SWOT ANALYSIS</b>	<b>40</b>
<b>7 </b>	<b>CONCLUSION</b>	<b>43</b>
<b>8 </b>	<b>REFERENCES</b>	<b>45</b>

APPENDICES	46
APPENDIX 1: COMPETITOR ANALYSIS TEMPLATE	46
APPENDIX 2: EXPERT INTERVIEW GUIDELINES	49

## List of Figures

<i>Figure 1: Interaction design principles according to Cooper [2]</i>	8
<i>Figure 2: TRIPLE Architecture</i>	9
<i>Figure 3: Stakeholder overview and categorisation</i>	12
<i>Figure 4: TRIPLE Power-Interest Matrix</i>	14
<i>Figure 5: PESTLE Factors</i>	15
<i>Figure 6: Gross domestic spending on R&amp;D Total, % of GDP, 2000 – 2019, EU 28 Countries [5]</i>	16
<i>Figure 7: Public spending on tertiary education, % of education spending, 2008 – 2015, EU 28 [7]</i>	17
<i>Figure 8: Population with tertiary education 25-34 year-olds, % in same age group, 2000 – 2018 [8]</i>	18
<i>Figure 9: Researchers Total, Per 1 000 employed, 2000 – 2018, EU 28 [9]</i>	18
<i>Figure 10: Competitor Platforms, Location, And Launch Year</i>	23
<i>Figure 11: Number of Competitor Platforms per type</i>	24
<i>Figure 12: Competitors’ platforms accordingly research output access modality</i>	26
<i>Figure 13: Lens.org landing page, the number of menus/service/tools offered may overwhelm the users</i>	28
<i>Figure 14: DataSearch platform presents clearly the research outputs types</i>	30
<i>Figure 15: Iris.ai platform screens showing the focusing study feature to illustrate the first two steps of the process: problem statement (top) and stage 1 (bottom)</i>	31
<i>Figure 16: Academia.edu - 5 minutes overview of a paper</i>	32
<i>Figure 17: Semantic Scholar - Research Feed feature</i>	32
<i>Figure 18: Jstor - Text Analyzer</i>	33
<i>Figure 19: Breakdown of non-profit Organisations</i>	34
<i>Figure 20: Breakdown “for-profit” Organisations</i>	34
<i>Figure 21: Overview on financing opportunities</i>	34

## List of Tables

<i>Table 1: Detailed Stakeholder analysis</i>	13
<i>Table 2: Summary of PESTLE factors</i>	22
<i>Table 3: Overview on analysed platforms</i>	25
<i>Table 4: Competitors’ platforms main features over 5 dimensions</i>	28
<i>Table 5: SWOT Analysis</i>	41

## Acronyms

EOSC	European Open Science Cloud
RI	Research Infrastructure
OS	Open Science
OECD	Organisation for Economic Co-operation and Development
USP	Unique Selling Proposition
AI	Artificial Intelligence
RO	Research Output
WP	Work Package
EC	European Commission
GDPR	General Data Protection Regulation
OA	Open Access

## Executive Summary

---

In the present report on Stakeholder- and Opportunity Analysis (D7.1), we provide the foundation for TRIPLE's exploitation strategy and TRIPLE's business model. By applying a broad mix of methods and tools we gained insights into relevant stakeholders, existing competition, the business environment, a first strategic orientation and derived recommendation for the future project work.

From stakeholder analysis, we gained information about the stakeholder roles and needs as well as indications on their power and interest. Out of that data, we derived management strategies for specific stakeholder groups. The results are presented in an informative overview table and in a Power- Interest matrix. From our conducted environment analysis (PESTLE) we got rich information on each of the six categories. All detected factors were briefly described, classified as positive or negative and summarised in a table. The results were further processed in the finally conducted SWOT analysis.

In order to get a broad overview of the competitive environment twenty-six scholarly communication platforms were evaluated through web-based research. The analysis covers an overview of offered features and functions, organisational insights, strengths & weaknesses as well as impressions on usability and user experience. Looking at the products and services provided by the competitors, we recognize that the planned feature-set for TRIPLE platform represents unique features that will distinguish TRIPLE from the competition. Attention needs to be paid on a number of agile platforms which constantly release innovative (e.g. AI-powered) features. To complement the vantage points gained from the web-based competitor analysis an interview study with general Open Science Experts and executives from existing Open Science platforms was conducted. The interview results show that despite the many platforms and services available, there are still unoccupied market niches and underrepresented user groups.

Finally, the conducted SWOT analysis shows first insights on how we can use our strength to balance our threats and weaknesses, to minimize risks, and to take the greatest possible advantage of chances for success.

## 1 | INTRODUCTION

The TRIPLE platform aims to offer a discovery solution for Social Sciences and Humanities (SSH) research based on three different kinds of objects; data (and publications), profiles and projects. It envisions the building of a digital research solution for researchers, which can be composed and customized according to requirements, at the European scale. Through the TRIPLE platform, the visibility and accessibility of SSH research will be improved dramatically, leading to an increased impact. This is made possible by the high level of modularity of the TRIPLE platform and the strong engagement and commitment of the partners involved and the resulting responsiveness and agility of the project.

The present report is the first outcome from WP 7 (Innovation, Exploitation and Sustainability) which aims to create a valuable and viable business model for TRIPLE platform that is sustainable beyond project end. Our approach to this is based on design thinking procedures [1] and business model innovation methods. In general, it is about planning and developing in a user-oriented way. People, processes, products and technologies interact with each other and have to be coordinated and linked in a holistic way.

Within the project and in particular, within WP7 we are primarily guided by Alan Cooper's interaction design principles [2] for developing a successful digital product. The main guiding principle is:

*A successful digital product needs to be desirable, viable and buildable.*

To achieve this, we need to work on these three topics in parallel as displayed in Figure 1.



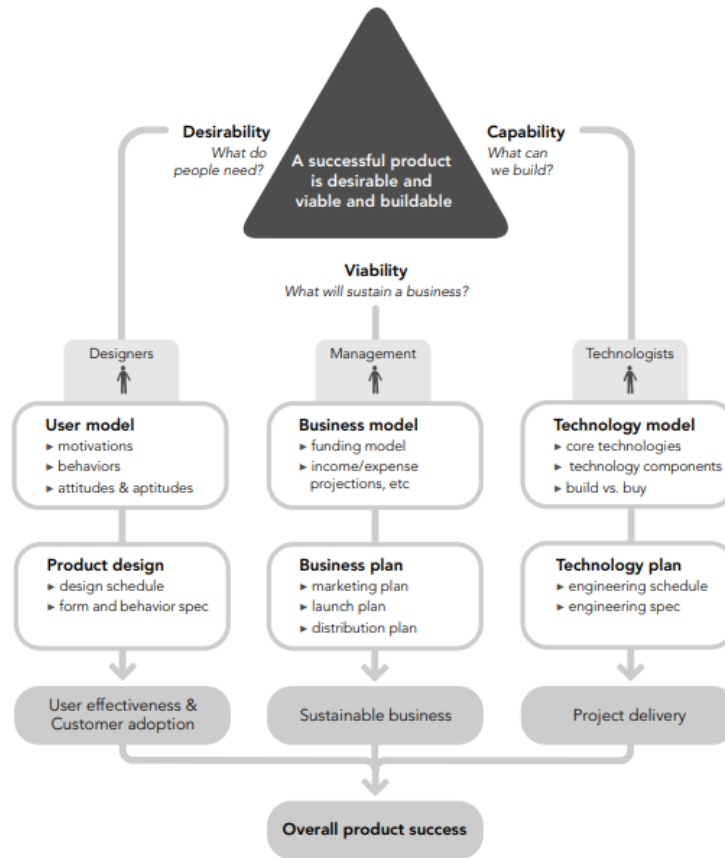


FIGURE 1: INTERACTION DESIGN PRINCIPLES ACCORDING TO COOPER [2]

The intersection of these three processes (desirability, viability, and feasibility) defines the sweet spot of innovation where we aim to. Getting there requires a multi-framework approach which is realised in TRIPLE project by a clearly defined WP structure and respective responsibilities. The main responsibility for “Desirability” lies in Co-design WP (3) which delivers the user and co-design research for the project. Here we get answers to the question: What do people need and how can this be translated into a usable interface? Development and Integration WPs (4, 5) take care of “Capability” and are liable for the development and integration of the TRIPLE platform (core) and its innovative services. This outcome contributes to the leading question: What can we build?. Last but not least Exploitation and Sustainability WP (7) is accountable for “Viability” and takes care of a sustainable business. As already mentioned a successful digital product needs a balance and cooperation of all three processes as well as continuous support by supporting WPs like Project Management, Data Acquisition, EOSC Integration and Communication Management.

## 1.1 Planning Status of TRIPLE Platform

The current technology and implementation plan outlined in Deliverable 4.1 serves as the basis for this report and is briefly described below. The future TRIPLE platform is built on two main pillars: The Core and Innovative Services (see Figure 2): TRIPLE Core includes a search engine

built on ISIDORE technology (provided by Huma-Num). The search engine is capable of learning (AI) based on the content and metadata of the SSH outputs researchers find relevant, such as data from publications, profiles and projects. For doing so, repositories are trained during the whole process of data enrichment in a multilingual and multidisciplinary context.

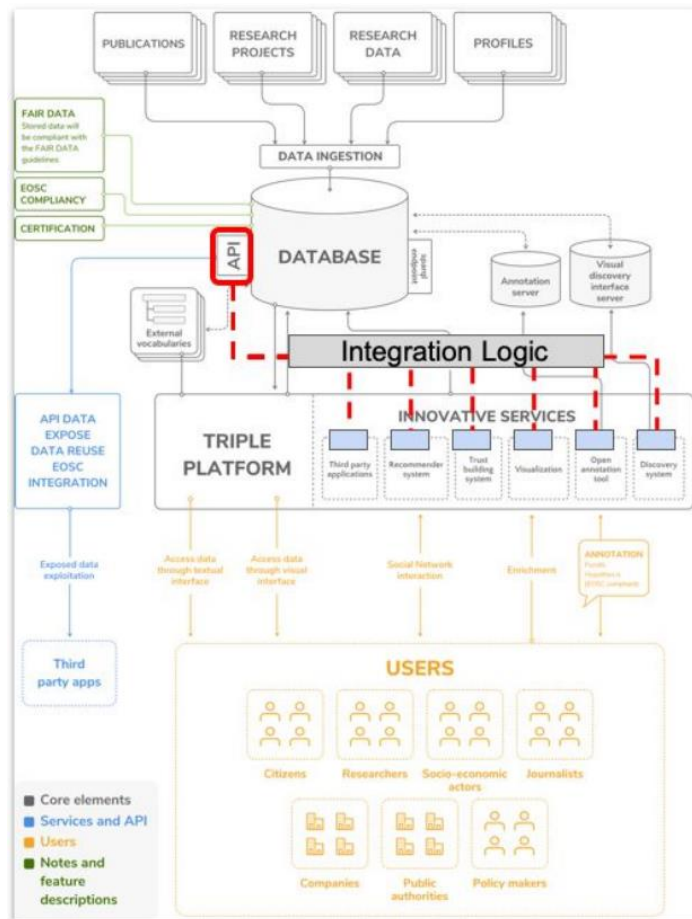


FIGURE 2: TRIPLE ARCHITECTURE

The second pillar, developed by Integration WP (5) is to design, develop and integrate innovative applications and tools that are not part of the core of the TRIPLE platform. These tools should empower users' workflows when accessing the advanced discovery features of TRIPLE. In this work package, the following five specific tools (Innovative Services) will be integrated into TRIPLE platform:

- a recommender system (ScaR)
- a trust-building system
- a diagram of services
- an open Web Annotation tool (Pundit)
- a visual Discovery system (Head Start)

Moreover, within a specific task (T5.1), services identified as valuable and useful for SSH researchers during the requirement analysis and stakeholder and opportunity analysis (outlined in the present report) will be also integrated into the TRIPLE platform.

## 1.2 Objectives and Structure of the Report

The current report provides the context for the exploitation and sustainability business modelling through a detailed analysis of existing competitors, the business environment and existing and potential stakeholders. The main objectives are:

- getting insights (needs, roles, management strategies) into TRIPLE actors
- obtain knowledge on TRIPLE's business environment
- receive detailed information on competition in terms of offerings, strengths & weaknesses, financials, learnings and inspiration for TRIPLE
- gain input for TRIPLE's competitive position and strategic planning.

For achieving above mentioned goals, a broad mix of methods and tools has been used. The report starts in section 2 with a general stakeholder analysis. In section 3 the PESTLE analysis was used to screen the business environment. This should help to examine positive or negative external events and influences for TRIPLE platform. In order to get a profound picture on competitor platforms, the WP7 team conducted an in-depth desk research on existing scholarly communication platforms which is presented in section 4. In order to complement the results from section 4, we collected qualitative data through an interview study with general Open Science Experts and executives from existing Open Science platforms. In section 5 we used a SWOT analysis to evaluate TRIPLE's competitive position and derived first input for future strategic planning. Finally, the report concludes with a summary section.

## 2 | STAKEHOLDER ANALYSIS

Stakeholder analysis is a technique that identifies those actors, groups or individuals who have an influential interest in a project and business model. It is usually carried out in the run-up to or early phase of a project. Relevant "stakeholders" (= interest or stakeholder groups) are systematically surveyed, briefly described and their significance and influence on the course and outcome of a project assessed. Based on this, the involvement of the relevant stakeholders before, during and after a project phase can be planned at an early stage and any necessary action can be derived [3].

Within this analysis we agreed to focus on external stakeholders. An internal stakeholder analysis will be presented in the upcoming Deliverable 7.2 (Intermediate Report on Exploitation and Sustainability). To carry out the analysis we use the following 3 steps approach:

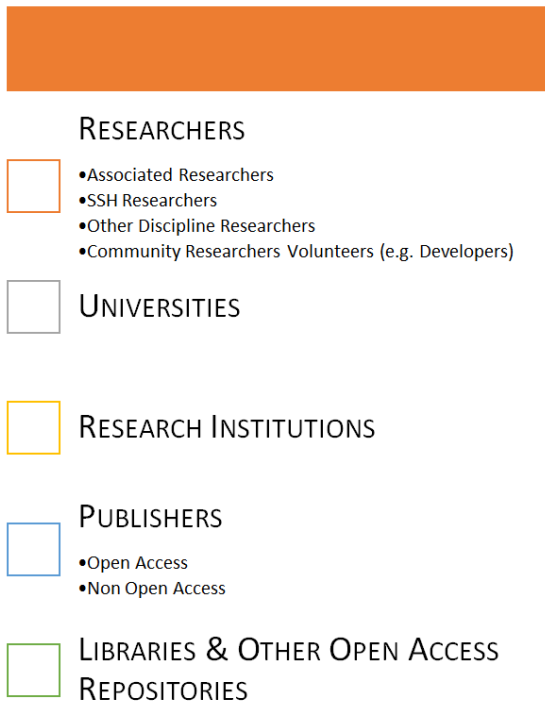
- Identification of stakeholder
- Analysis of stakeholder influence
- Derive measures for stakeholder management

### 2.1 Identification of stakeholder

Based on the stakeholders already identified in the project proposal, the WP team has been intensively engaged in the search for relevant groups and individuals at the kick-off in Paris and in subsequent virtual meetings. The result was an extensive list of potential stakeholders that was intensively discussed and through an iterative process structured and categorised.

Since our main users come from the academic field and will be also included in our co-design activities, we agreed on two main differentiating criteria: academic and non-academic stakeholders. Subsequently, five representative stakeholder groups were identified for each main category, including possible subgroups as shown in Figure 3.

## ACADEMIC



## NON-ACADEMIC



FIGURE 3: STAKEHOLDER OVERVIEW AND CATEGORISATION

## 2.2 Analysis of stakeholder influence

After identification of stakeholder in 2.1 we conducted a detailed categorisation and analysis concerning the following criteria (see Table 1):

- what is the role in the project (user, data provider, financial means, multiplier)
- what do we need the stakeholders for (financial contribution, data provider, technical support, dissemination etc.)
- what is their potential contribution (access to SSH research, increased visibility, access to experts etc.)
- classification regarding power and influence on the project (High/Low)
- derived main strategies for stakeholder management (manage closely, keep satisfied, keep informed, monitor)

TABLE 1: DETAILED STAKEHOLDER ANALYSIS

Name	Roles	Contribution from Stakeholder?	Benefit for Stakeholder?	Power/ Interest	Mgmt.
Researcher (SSH, other disciplines)	User, Data Provider, Multiplier	provide usage data, profile data, project data, get feedback	easy and useful access to SSH research and experts,, increased visibility	High/ High	manage closely
Universities	User, Financial Means, Multiplier, Data Provider	funding, in-kind contribution, research data, dissemination support	increased visibility, image gain, access to SSH research	High/ High	manage closely
Research Institutions & Research Infrastructure	User, Data Provider	provide usage data, profile data, project data, get feedback, technical support	easy and useful access to SSH research, increased visibility	High/ High	manage closely
Publishers (e.g. OA, Non-OA)	User, Data Provider, Financial Means	research data	increased visibility	Low/ High	keep informed
Libraries & Other Open Access Repositories	User, Data Provider, Financial Means Multipliers	research data, financial contribution	increased visibility, trusted data	High/ Low	keep satisfied
Citizens (Citizens Scientists)	User, Multiplier	usage data	trusted data	Low/ Low	monitor
Media (Science Journalists)	User, Multiplier	usage data	trusted data, access to experts	High/ High	manage closely
Organisations (e.g. SME, NGO)	User, Financial Means	revenue source	access to experts, trusted data	High/ Low	keep satisfied
Public Authorities (Municipalities, Parliaments)	User	usage data	access to experts, trusted data	Low/ High	keep informed
Policy Makers (EU/national Ministries & Funding Institutions)	User, Financial Means	usage date, funding	access to experts, trusted data	High/ Low	keep satisfied

## 2.3 Measures for stakeholder management

In addition to examining the influence of individual stakeholders in terms of roles, contribution and benefits, a rough classification of power and interest have already been made in 2.2. For further determination, we have classified the stakeholders in the influence-interest matrix [4] depicted in Figure 4. The general management strategies can be described as follows: Stakeholders with high power and low interest shall be kept satisfied. Those with low interest and low power shall be only involved with minimum effort. A stakeholder with low power and

high interest in a project shall be kept informed and finally the high power, high interest stakeholders shall be closely involved and informed.

Based on TRIPLE project, the following measures result for the four groups:

Low/Low quadrant: We assume that citizens have little self-interest in the project and can only exert little influence. This group should be informed and included in the minimally offered way e.g. passive informed via TRIPLE website and social media channels.

Low/High quadrant: The stakeholders in this quadrant (publishers and public authorities) have a great interest in the project, but they have little opportunity to influence it. According to their interests, they should be involved in particular through a good flow of information. We should try to get feedback from this group and push for active cooperation with reasonable effort e.g. invite representatives to co-creation workshops.

High/Low quadrant: This group (Libraries, OA Repositories, Policy Makers, Organisations) is largely passive and has little interest in what is going on in the project, but may have considerable influence on the project. e.g. as a possible user group for paid services. For this reason, these actors should be given special consideration and actively involved in the design of our innovative services or new services e.g. easy-to-read summaries of research papers.

High/High quadrant: The stakeholders from this quadrant, above all the researchers as our main users, are of course most important for TRIPLE. The active cooperation of this group is guaranteed by the planned active involvement in the Co-design and user research WP through interviews, surveys, co-creation workshops etc.

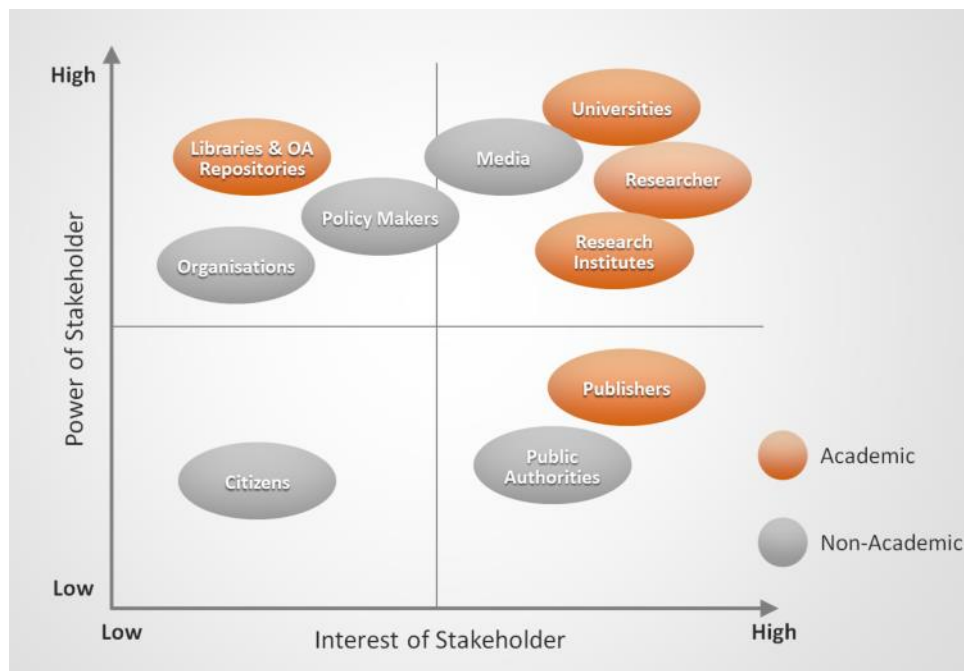


FIGURE 4: TRIPLE POWER-INTEREST MATRIX

### 3 | PESTLE ANALYSIS

PESTLE is an analysis tool [5] which helps to examine external events and influences with regards to their effect on an organisation's performance. It gives a bird's eye view of the whole environment from many different angles on a certain idea, in our case on the future TRIPLE platform. PESTLE is an acronym that stands for Political, Economic, Social, Technological, Environmental and Legal factors (see Figure 5). All factors can affect the future TRIPLE platform in positive or negative ways. We have assigned each main factor to a partner within WP7 with the task to collect possible influencing factors in the respective category. After the partners have determined the factors, they were classified as positive or negative. A summary of the PESTLE factors is presented in Table 2.

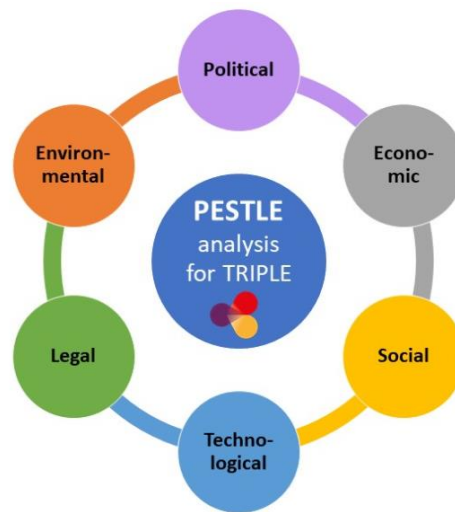


FIGURE 5: PESTLE FACTORS

#### 3.1 Political

These factors are influences which are determined by governmental decisions. They include, for example, tax policies, trade regulations, financial and employment laws, etc. These factors strongly influence many aspects of an organisation's environment which are closely related to an organisation's internal process. For instance regulations regarding employment law, consumer protection, data protection law, competition regulations or environmental laws. This also includes the effects of the level of bureaucracy or the general stability of a government.

With regards to TRIPLE specifically decisions made by the government (EU or national) are political factors. Governments have a great impact on the public facilities in a country, but also on the economy. Decisions regarding policies, laws, restrictions, tariffs, tax regulation, governmental programs and grants on EU and national level will have a direct impact on TRIPLE during the project phases and also when the project duration is over.

Positive legal factors are mainly derived from the European Commission's (EC) commitment to advance Open Science, invest in pan-European research collaboration and support diversity as



well as discipline-specific approaches to Open Science. It should be noted that this commitment does not only apply to Open Science infrastructure. Negative influences could be caused by a lack of recognition of the socio-economic impact by Social Sciences and Humanities. This may lead to reduced funding opportunities in this field of research.

At this moment it is also unclear how the COVID-19 crisis will affect general funding policies within the EU. On the downside for TRIPLE, there is already a funding shift to finance initiatives which counter the immediate economic and social impact. For now, COVID-19 essentially stops most of the long-term planning (beyond ~2-year horizon). All the research areas that can contribute to the acute response are being geared to this direction (biomedicine especially). SSH can and should play a role in understanding the societal mechanisms that limit or speed up the spread of the epidemics. However, TRIPLE's role in COVID-19 will probably be in providing tools for distilling lessons learned that can be extremely valuable in addressing future outbreaks.

A positive impact for TRIPLE can be found in the growing momentum for a general shift towards digital infrastructures as mobility and meetings are restricted. Opening more need for open science and digital infrastructures to support research collaboration. Also, the growing awareness for wider societal challenges can be seen as a positive impact for TRIPLE.

### 3.2 Economical

Economic factors are in close relation with goods, services and money. They affect organisations directly (f.e. pricing strategies) as well as indirectly (f.e. inflation rate) through the general financial state of an economy. Examples for these components are interest rates, exchange rates, taxes and the level of demand and supply.

Statistics derived from the OECD state that the gross domestic spending on R&D (see Figure 6) is on the rise across Europe. This includes the total expenditure (current and capital) on R&D carried out by all resident companies, research institutes, universities and government laboratories [5].

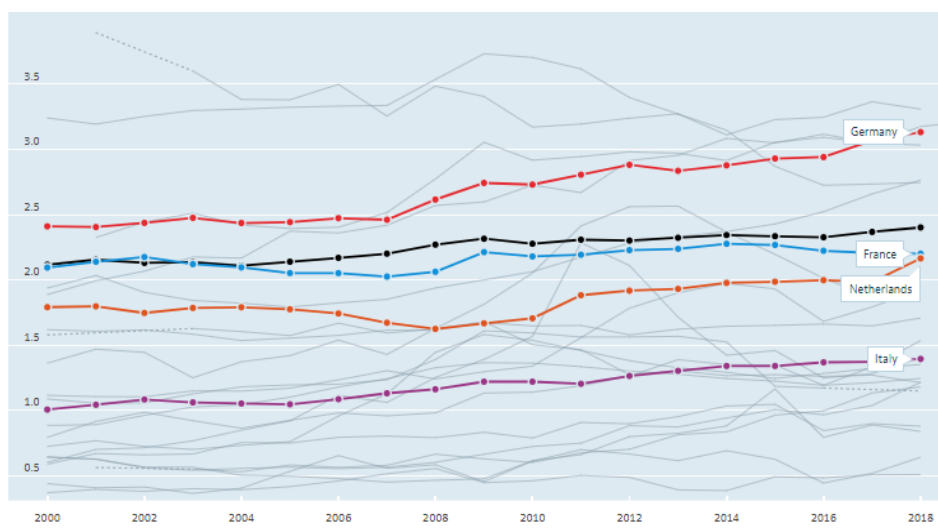


FIGURE 6: GROSS DOMESTIC SPENDING ON R&D TOTAL, % OF GDP, 2000 – 2019, EU 28 COUNTRIES [5]

Parallel to that the overall education spending in EU-28 countries is somewhat stable [6]. Education spending covers expenditure on schools, universities and other public and private educational institutions. Spending includes instruction and ancillary services for students and families provided through educational institutions. Spending is shown as a percentage of GDP.

On the downside, the overall public spending on tertiary education in EU 28 countries [7] is on the decline (see Figure 7).

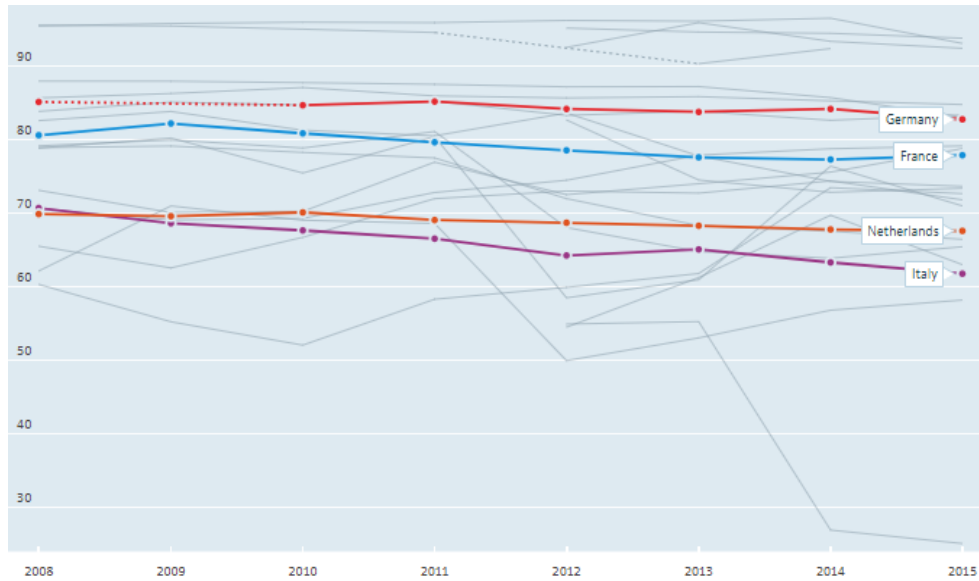


FIGURE 7: PUBLIC SPENDING ON TERTIARY EDUCATION, % OF EDUCATION SPENDING, 2008 – 2015, EU 28 [7]

Spending on tertiary education is defined as the total expenditure on the highest level of education, covering private expenditure on schools, universities, and other private institutions delivering or supporting educational services. The measure is a percentage of total education spending. At the tertiary level educational institutions in OECD countries are mainly publicly funded, although there are substantial and growing levels of private funding.

Finally, one important and not to be neglected economic factor is the competition in the field of scholarly communication tools. As extensively described in chapter 4 (Competitor Analysis), there are already a lot of advanced platforms on the market that occupy many market niches.

### 3.3 Social

These factors support the investigation of an organisation's social environment. Determining influencing factors in this area are, for example, cultural trends, demographics, immigration rates or the education level of the population. The focus of these elements lies in forces within the society which shape attitudes, opinions and interests. They are strongly connected with family, friends, neighbours or social media.

As TRIPLEs main target groups are knowledge workers and the population with tertiary education is on the rise (see Figure 8) this can be seen as a positive factor. The latter group is

defined as those having completed the highest level of education, by age group. This includes both theoretical programmes leading to advanced research or high skill professions such as medicine and more vocational programmes leading to the labour market. The measure is the percentage of the same age population, also available by gender [8]. As globalisation and technology continue to re-shape the needs of labour markets worldwide, the demand for individuals with a broader knowledge base and more specialised skills continues to rise.

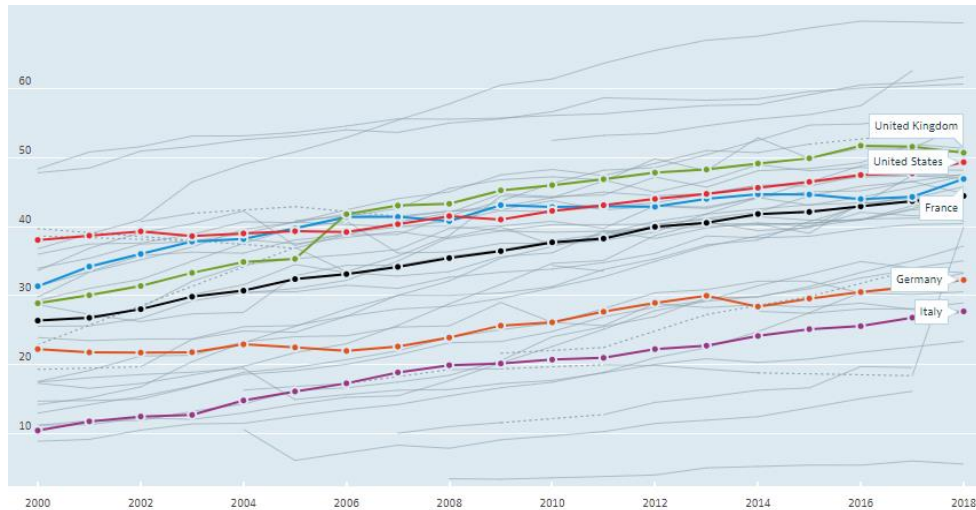


FIGURE 8: POPULATION WITH TERTIARY EDUCATION 25-34 YEAR-OLDS, % IN SAME AGE GROUP, 2000 – 2018 [8]

There is also a pan-European increase in people employed in research (see Figure 9), which influences TRIPLES in a positive way. Researchers are defined as professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems, as well as in the management of the projects concerned. This indicator is measured in per 1 000 people employed and in number of researchers [9].

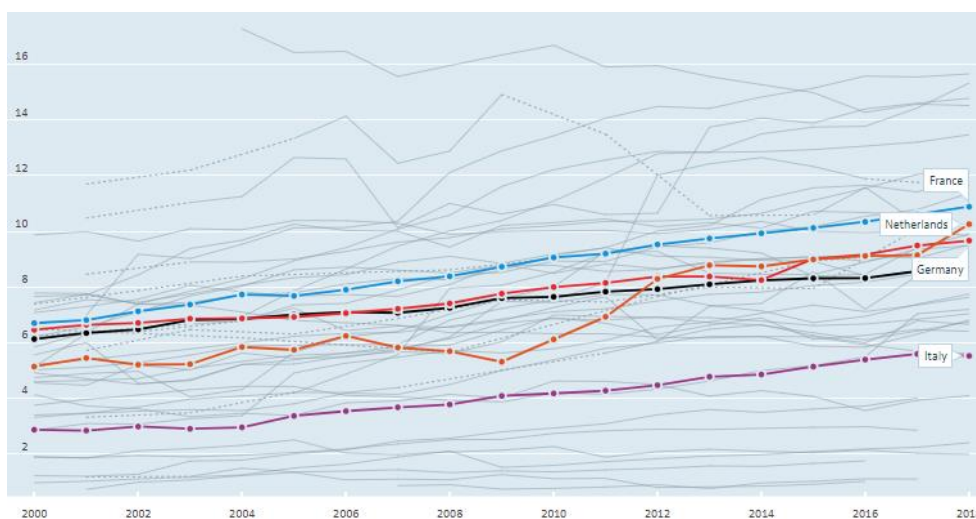


FIGURE 9: RESEARCHERS TOTAL, PER 1 000 EMPLOYED, 2000 – 2018, EU 28 [9]

In addition to these statistical facts, the trend towards sharing economies - which also includes the sharing of knowledge - is already manifested in many different areas. We also see a high potential in the generation of Millennials, which are the future users of the TRIPLE platform, representing a highly digitized and socially mobile target group.

### 3.4 Technical

Technological factors concern innovations in technology. They determine the existence, availability and development of technology. Areas strongly connected to these factors are automation, research & development and the general technological awareness a market possesses. They strongly influence decisions made with regards to which technologies businesses choose or have to invest in, in order to stay up-to-date or to become a leader in their field.

One major technological trend is the increased relevance of Artificial intelligence/Machine Learning. This is in-line with raising interests in AI development and EC funding areas. For example, EOSC (cataloguing services, data and other resources) in INFRAEOSC03 will implement AI techniques for the EOSC Portal to enable more intelligent searches. For this reason, TRIPLE investigates AI technology to improve the searching capabilities. Reduced costs for increased availability of high-performance networks have a beneficial effect. TRIPLE can thus rely on external computer resources to scale up service provisioning. Also, network bandwidth is getting cheaper and more ubiquitous. For example, EGI a pan-European e-Infrastructure federating HTC and Cloud resources across Europe and worldwide. TRIPLE can make use of such e-Infrastructure resources and services to support more SSH researchers.

Another positive influence is the fact that Single Sign-On solutions are becoming a commodity. TRIPLE will integrate EGI Check-In to authenticate and authorize users' access. This Check-in provides federated Identification management that can support TRIPLE community users to have easy sign-on using their own institution accounts. The check-in is adopted by EOSC-portal and many other European high-impact scientific communities. This has a similar impact as the improvements of the network infrastructure noted above: time/effort needed to experiment with transdisciplinary approaches drops as there is no need to create separate accounts for the different data sources.

The trend towards mobile (or tablet) as the dominant medium, may have a negative influence on TRIPLE. The limitations and new opportunities of mobile platforms may require at least a partial re-design of the user-facing applications. For TRIPLE it is important to understand the use cases that researchers would want to carry out on a mobile phone and prioritize those. Dealing with the small displays is perhaps the most obvious but challenging issue. Generic frameworks may help up to a point, but the inherent limitations of a small screen in building an overview of several search results will probably require new application logic ("swipe left or right" to refine fuzzy criteria to include/exclude research results could be useful in some cases).

Mobility will also mean that the applications would need to pay more attention to uncertainties related network connections (major transactions - such as file uploads - will get interrupted, it

should be possible to resume them). Speech input as a commodity solution will probably need to be addressed: assessing the point where it might be good enough to at least complement traditional transliteration approaches may have an impact on the “brand image” of the whole platform. Too early and poor quality might reflect badly on all data accessible through the platform (even if presented as a convenience, “draft preview + automatic tagging tool”). Too late, and the platform might seem outdated. In any case, tech-topics involve additional R&D effort for the project which is not covered yet.

### 3.5 Legal

Legal factors refer to laws and legislation that can affect how an organisation operates. They include transversal legal areas such as trade regulation, employment legislation, consumer rights or more domain-specific legislation such as health and safety guidelines. Laws and legislation can be adopted and enforced at various levels: international, European, national or even local. Besides, legal factors are closely associated with ethical standards which influence stakeholders’ perception of the organisation. Finally, it should be noted that political and legal factors sometimes intersect, since one of the main roles of any government is to legislate.

A priori, the TRIPLE platform won’t be a legal entity as it is designed to be a service which will, once the European project is completed, be hosted either by a single organisation or a consortium of organisations. As such, the legal environment of the platform will depend on different aspects, as for now many questions remain unanswered: Which legal entity/entities will own the platform? Where will it/they be geographically based? In which country/countries will the people employed to work on the platform be located? In which country/countries will the technical infrastructure be hosted? Etc. Once these questions are resolved, it will be possible to measure, for example, the impact of employment regulations, tax laws, consumer rights on the TRIPLE platform, the constraints and costs but also the opportunities that it can generate.

However, we can already establish that a certain number of laws will have a direct impact on the TRIPLE platform, whether during its creation or its future management. This is the case in particular for the GDPR – General Data Protection Regulation – and the copyright legislation. Both represent at the same time a constraint and an opportunity. The TRIPLE platform should make sure on the one hand that collection and processing of personal data of individuals (e.g. user profiles) meets the requirement of data protection: records, security or the appointment of a data protection officer. On the other hand, the TRIPLE platform should consider that the data retrieved and presented (scientific data, publications, outputs from scientific projects), usually from a third-party provider, may be subject to certain copyright protections (or personal data protection) and inform the users about their possible reusability. Nevertheless, the use of FAIR data and the focus on Open Science principles should drastically mitigate the risk of copyright infringements.

Nonetheless, these constraints can also become a source of opportunities for the platform. On the one hand, the more the service is protective of its users' personal data and transparent about its use, the more users will have confidence in the service and the more inclined they will be to use it. This transparency can be an advantage compared to some (partly) competing

platforms such as Researchgate or academia.edu. On the other hand, pointing to scientific data and outputs which follow the principle of Open Science will contribute to their promotion and dissemination in the academic landscape and as a result will ultimately improve the quality and quantity of data available on the TRIPLE platform.

Finally, if we consider that the platform will offer some commercial activities for specific end-users, it will be required to consider eventual issues related to commercial and tax law (contract, procurement, liabilities, cross-border VAT issues, etc.) or possibly even intellectual property rights for certain activities. Without more details on the possible nature of the commercial activities that the platform could propose, it is difficult to analyse the impact of the related legal factors.

As the project develops, the analysis of the legal factors which have an impact on the TRIPLE platform can be refined, bearing in mind that the legal environment is in constant evolution.

### 3.6 Environmental

The Environmental factors include all those aspects that are determined by the surrounding environment such as climate, weather, geographical location etc. Also, elements that influence ecology are part of these components; they include, for example, natural resources, waste disposal or recycling.

With regards to TRIPLE, the EC commitment to a 'greener' and more sustainable Europe is a positive influence. Also, the millennial generation is developing a more responsible approach to the environment and may choose and use products and services accordingly. A downside of the digital solution offered by TRIPLE is its potentially large CO<sub>2</sub> footprint due to electricity consumption of online tools.

### 3.7 Conclusion and relevance for TRIPLE

Table 2 provides a compact overview of all detected factors for each category. The political and economic factors show a rather balanced relationship between positive and negative. From today's perspective, it is difficult to judge which of the positive or negative factors will have more significance in the future. The many positive ones in the field of technology should not obscure technical trends that can become relevant very quickly. It would be very difficult for TRIPLE to pick up on these fast enough. For this reason, the consortium and especially the technical partners must keep a very close eye on them.

Since social factors tend to have a long-term effect, it is unlikely that they will have a rapid effect, either positive or negative. Nevertheless, it is pleasing that the positive factors found to outweigh the negative. In the area of legal ones, we are of course in the area of tension between national and EU legislation. As outlined in chapter 3.5, mainly copyright and data protection regulations are relevant for TRIPLE. Of course, these have to be closely monitored by the whole consortium. The environmental factors are not decisive for the project but we did not want to

leave these unmentioned. The results of PESTLE analysis will be included and further processed in the SWOT analysis (see chapter 6).

TABLE 2: SUMMARY OF PESTLE FACTORS

<p><b>POLITICAL</b></p> <ul style="list-style-type: none"> <li>+ EC committed to OS</li> <li>+ EC focus on pan-European research</li> <li>+ EC committed to support diversity</li> <li>- Diminishing research funding</li> <li>- Lack of recognition of SSH</li> </ul>	<p><b>ECONOMICAL</b></p> <ul style="list-style-type: none"> <li>+ Gross domestic spending on R&amp;D rising</li> <li>+ Education spending stable</li> <li>- Reduced public spending on tertiary education</li> <li>- Competition on established players in the search engine world</li> </ul>
<p><b>SOCIAL</b></p> <ul style="list-style-type: none"> <li>+ Population with tertiary education rising</li> <li>+ People employed in research rising</li> <li>+ Cultural trend sharing economy</li> <li>- Fake news and difficult verification of web content</li> </ul>	<p><b>TECHNOLOGICAL</b></p> <ul style="list-style-type: none"> <li>+ Artificial intelligence / Machine learning is raising up</li> <li>+ Network bandwidth getting cheaper, more ubiquitous</li> <li>+ Cloud computing and container technologies making scaling up deployment on new sites easier</li> <li>+ Single sign-on solutions are becoming a commodity</li> <li>- Mobile (or tablet) as the dominant medium and speech recognition not addressed.</li> </ul>
<p><b>LEGAL</b></p> <ul style="list-style-type: none"> <li>+ Protection of personal data and transparency of its use build users' trust</li> <li>+ TRIPLE is a good advocate for future legislation on Open Science</li> <li>- Uncertainties regarding future governance and possible commercial activities</li> <li>- Eventual constraints in the building of the platform regarding GDPR and copyright regulations.</li> </ul>	<p><b>ENVIRONMENTAL</b></p> <ul style="list-style-type: none"> <li>+ Generational shift towards more responsibility for the environment</li> <li>- Large CO2 footprint of server based online tools</li> </ul>

## 4 | COMPETITOR ANALYSIS

The competitor analysis allows us to identify and understand competitors’ strengths and weaknesses in relation to TRIPLE offers. The competitor analysis helps to recognize the needs of potential users and to learn how they rate the competition. Most importantly, the competitor analysis is a mechanism to develop effective competitive strategies and provides insights into what gives TRIPLE an advantage over the target market. Moreover, it aims to clearly distinguish TRIPLE from competitors.

### 4.1 Identifying relevant competitors

A list of competitor platforms was created in collaboration with the project members of Exploitation and Sustainability WP (7), this list features competitor’s platforms that offer similar services and share target markets. A total of forty-seven platforms were identified as potential challengers. The Alexa rank score was used to determine these platforms popularity. The Alexa rank is a global ranking system ([www.alexa.com](http://www.alexa.com)), which considers the estimated average of daily unique visitors and the number of page views over the past three months. The top 10 ranked platforms were included in the competitors’ analysis, as well as sixteen others selected by the project member.



FIGURE 10: COMPETITOR PLATFORMS, LOCATION, AND LAUNCH YEAR



In order to verify that the twenty-six selected platforms represented TRIPLES’ competitive environment, the consortium partners classified the platforms using the typology suggested by an Open Science expert group from OPERAS project<sup>1</sup>. This typology resulted from a survey which addressed current practices, habits and issues related to scholarly communication in social sciences and humanities. The typology consisted of the following ten types: 1) academic search engines; 2) multidisciplinary academic databases; 3) disciplinary academic database; 4) library catalogues and discovery systems; 5) search engines and directories for open access resources; 6) repositories - institutional or subject; 7) dissemination platform; 8) shadow libraries; 9) large digitized collections; 10) science-oriented social media.

Three raters classified the platforms accordingly with the aforementioned typology. We performed an inter-rater reliability analysis via the Fleiss' Kappa statistic to determine the raters' consistency. The inter-rater reliability for the raters was Kappa = 0:91 (p =0, z=24:6), indicating a very good agreement.

Figure 11 provides an overview of the twenty-six competitors’ platform diversity, accordingly with the chosen typology. All the types of platforms are presented, but we gave preference to platforms academic search engines, science oriented social media, and search engines and directories for OA resources.

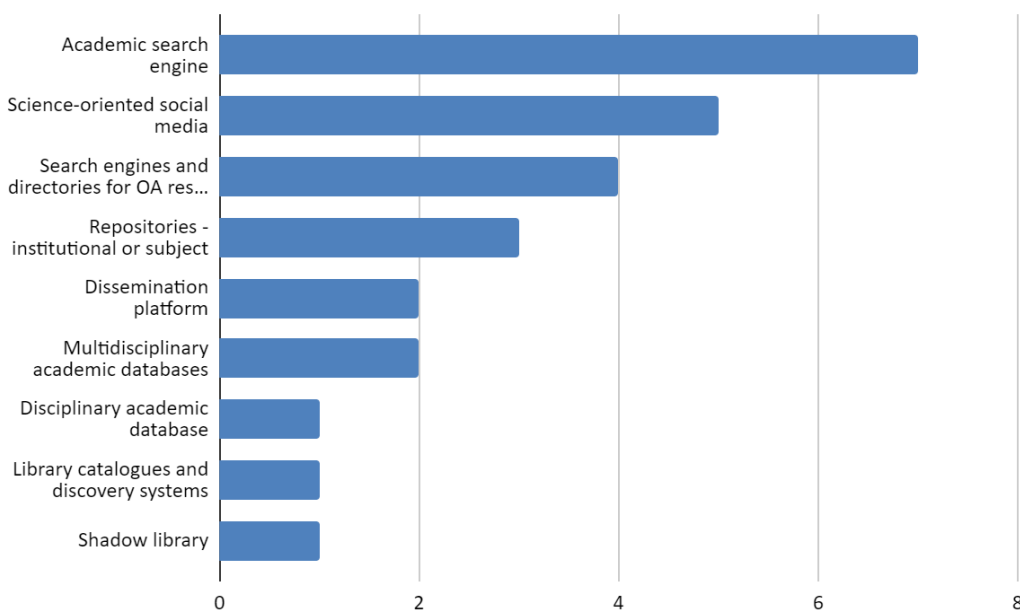


FIGURE 11: NUMBER OF COMPETITOR PLATFORMS PER TYPE

<sup>1</sup> OPERAS is the European Research Infrastructure for the development of open scholarly communication in the social sciences and humanities <https://operas.hypotheses.org/>.

Table 3 lists the twenty-six competitor platforms ordered by popularity, and shows each platform type.

TABLE 3: OVERVIEW ON ANALYSED PLATFORMS

Competitor Platform	Type of Platform	Alexa Site Rank
Google Scholar	academic search engine	1 <sup>2</sup>
Researchgate	science-oriented social media	165
Academia.edu	science-oriented social media	238
Elsevier Data Search	academic search engines	629 <sup>2</sup>
Semantic Scholar	academic search engines	1.124
JSTOR	search engines and directories for OA resources	1.247
arXiv.org	search engines and directories for OA resources	2.129
Frontiers	academic search engines	3.641
Mendeley	science-oriented social media	4.169
ORCID	multidisciplinary academic databases	5.151
CORE	search engines and directories for OA resources	5.660
Zotero	science-oriented social media	13.117
zenodo	repositories - institutional or subject	50.563
Center of Open Science	dissemination platform	58.660
Nextstrain	disciplinary academic database	62.172
figshare	repositories - institutional or subject	71.192
ScienceOpen	dissemination platform	212.714
unpaywall	search engines and directories for OA resources	220.255
Lens.org	academic search engines	311.403
OpenAIRE Explore	repositories - institutional or subject	369.908
Humanities commons	science-oriented social media	383.307
DataCite	multidisciplinary academic databases	407.533
Iris.ai	academic search engines	619.629
Isidore	academic search engines	1.523.750
Biblissima	shadow library	4.535.602
huni	library catalogues and discovery systems	n.a

<sup>2</sup> The Alexa site rank uses the root address of the platform, therefore the score for Google Scholar and Elsevier Data Search, refer to Google and Elsevier

## 4.2 Analysis

The project members of Exploitation and Sustainability WP (7) evaluated the twenty six platforms through a web-based research and documented the results in a provided template (see Appendix 1). The template is structured according to a basic business model view. It describes what value the platforms offer its customers (value proposition), how this value is created (value creation) and how the platforms generate profits/cover costs from its activities (value capturing). Furthermore the analysis also covers organisational insights (board, team, legal form, etc.), strengths & weaknesses as well as impressions on usability and user experience. The twenty six completed analysis documentations were transferred into a summary table and evaluated through qualitative content analysis.

### 4.2.1 Competitors characterization

TRIPLE’s discovery tool aims to enable users, e.g., researchers, SMEs, media, citizens, to find open access SSH research data. Therefore, we analysed the competitors on these two dimensions, access modality and content. The twenty-six competitor platforms were classified as open-access, partly open-access, and non-applicable. We considered fourteen platform open-access (50%) because the research outputs are freely available online and there are no access barriers, e.g. copyright and licensing restriction, premium accounts. Nine platforms were considered partly open-access (38,5%) because some access barriers were present, even though part of the content is open-access. We identified three platforms that due to their nature we considered that the concept was not applicable. Figure 12 depicts the competitors’ platforms accordingly, the access modality, and ordered by popularity.

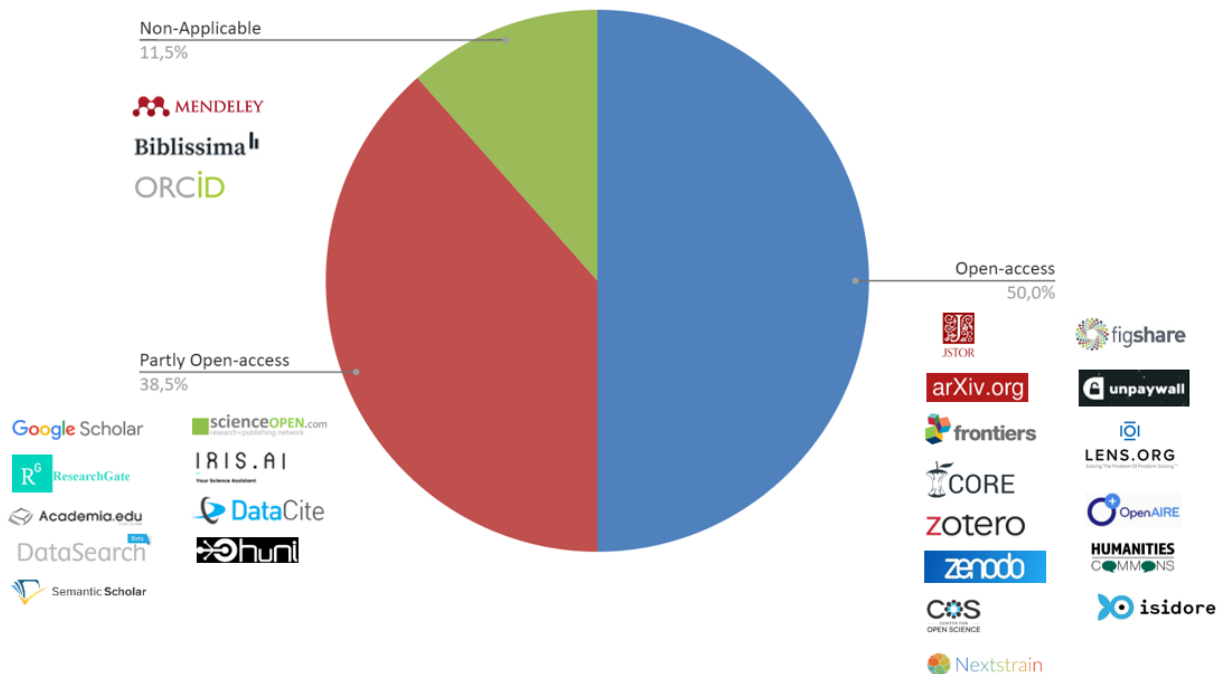


FIGURE 12: COMPETITORS’ PLATFORMS ACCORDINGLY RESEARCH OUTPUT ACCESS MODALITY

Regarding content specificity and Language availability, we verified that only three competitors are specifically targeting the SSH topic and communities, i.e. Humanities Commons, Huni, Isidore. All twenty-six platforms are available in English, and five of them offer two or more languages, i.e. Google Scholar, ORCID, Lens.org, Isidore, and Biblissima.

### 4.2.2 Usability & UX

The user's ability to achieve specific goals using a product, with effectiveness, efficiency, and satisfaction determines the usability of the product. Also, the user experience covers all aspects of the user's interaction with the organisation, the provided services and products. Good usability products arouse positive emotional experiences, improving the user experience design of the product. Next, we summarize the most important usability and user experience learnings relevant for TRIPLE.

- 1) User Interface should be clear and have an uncluttered design, should be aesthetically pleasing and appeal to all target audiences.
- 2) Common convenience features should be available, meeting in this way the users' expectations to easily perform tasks, e.g. bookmarking research outputs (RO), download and bulk download, access to full search history, and sharing RO.
- 3) TRIPLE should comply with the conventions of other similar search platforms, decreasing largely the learnability effort. The created user interface design should be, to a certain extent, predictable in layout and navigation.
- 4) In addition, the user should have easy access to Help & Documentation, FAQ, and video tutorials. These artifacts should help the user to take benefit of the offered features and services.
- 5) Target audience preferences and needs should be considered. TRIPLE target audience will have distinct needs and preferences, and therefore will explore the platform differently.
  - a) The design should be done with the SSH community in mind, e.g. Isidore, Huni
  - b) Achieve balance between large access, data quality, and scientific content
  - c) Allow personalization/customization
  - d) The interface should be adapted accordingly with the task/use case, and to prevent the user to be overwhelmed with all the services /tools. Figure 13 depicts Lens.org landing page, which offers so many options that may overwhelm the users.

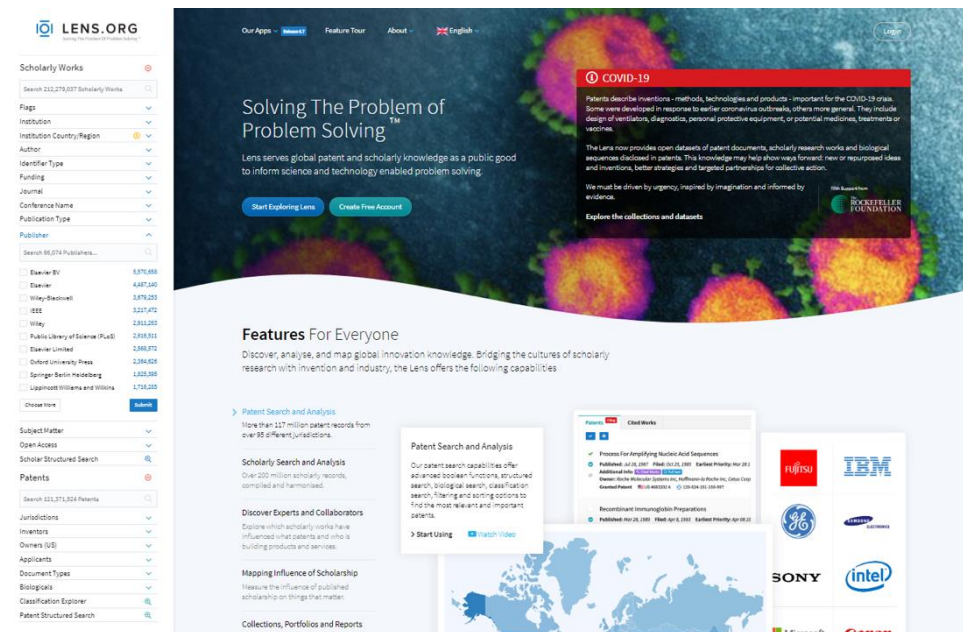


FIGURE 13: LENS.ORG LANDING PAGE, THE NUMBER OF MENUS/SERVICE/TOOLS OFFERED MAY OVERWHELM THE USERS

### 4.2.3 Relevant Functions & Features

The following table summarizes the main features of each of the platforms, considering the following dimensions: Search and filter Systems, recommendation system, social, annotation tools, and visual discovery. The search and filter system dimension, refers to the ability to search for research outputs, and use filters to further define the search criteria. The recommendation dimension indicates if the platform offers recommendations of e.g. research outputs, projects, and authors. The social dimension refers to features that leverage social interaction within the platform e.g. share articles, create groups, collaboration work. Some platforms were deemed as partly social even though they are not social platforms, but present social features to some extent. The annotation dimension refers to the availability of tools that allow users to annotate research outputs within the platform. Lastly, the visual discovery dimension refers to visual search and discovery interfaces.

TABLE 4: COMPETITORS' PLATFORMS MAIN FEATURES OVER 5 DIMENSIONS

Type	Competitor Platform	Search & Filter	Recommendation	Social	Annotation Tools	Visual Discovery
Academic search engine	Google Scholar	Yes	Yes	Partly		
	Elsevier Data Search	Yes				
	Semantic Scholar	Yes	Yes			
	Frontiers	Yes	Yes			Partly
	Lens.org	Yes	Yes			

	Iris.ai	Yes				Yes
	Isidore	Yes	Yes	Partly		
Search engines and directories for OA resources	JSTOR	Yes	Yes			
	arXiv.org	Yes	Yes	Partly	Partly	
	CORE	Yes	Yes			
	unpaywall	Yes				Yes
Science-oriented social media	Researchgate	Yes	Yes	Yes		
	Academia.edu	Yes	Yes	Yes		
	Mendeley	Yes	Yes	Yes	Yes	
	Zotero	Yes		Yes	Yes	
	Humanities commons	Yes		Yes	Yes	
Dissemination platform	Center of Open Science	Yes		Yes		
	ScienceOpen	Yes		Yes		
Repositories - institutional or subject	zenodo	Yes		Yes		
	figshare	Yes		Partly		
	OpenAIRE Explore	Yes				
Multidisciplinary academic databases	ORCID	Yes				
	DataCite	Yes		Partly		
	Nextstrain	Yes				Partly
Library catalogues and discovery systems	huni	Yes				Partly
Shadow library	Biblissima	Yes				Yes

We then analysed the qualitative data about the platforms' main features, strengths and weaknesses. Next, we present the most relevant findings for TRIPLE:

- 1) Quality of the search results is determinant for the success of such platforms. However it is complex to determine if the search results meet the users information needs. Therefore, enabling users to provide optional feedback about the relevance of the search results can be very useful.
- 2) The selection and ordering method of the search results should be made transparent to users, e.g. research output (RO) impact score, number of citations, authors.
- 3) A clear identification of the RO type in the search results is of great help for the user, e.g. the RO can be labeled as article, journal, peer-reviewed, dataset, video. DataSearch is a good example of how to manage RO types and clearly inform the user about the available RO (see Figure 14)

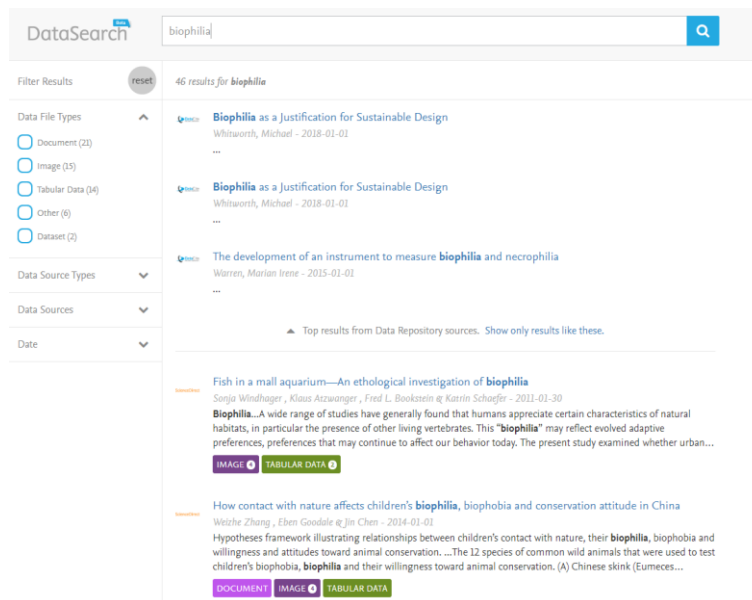


FIGURE 14: DATASEARCH PLATFORM PRESENTS CLEARLY THE RESEARCH OUTPUTS TYPES

- 4) Enrichment and link between different RO types adds value to search results, as well as providing useful contextual information.
- 5) High quality metadata can make an important contribution to search- and discovery services. A good example is the DataCite platform, which not only shows the importance of persistent identifiers, but also how valuable a well-chosen metadata scheme can be. Nevertheless, DataCite also illustrates how difficult it can be to find search solutions that are general enough to cover various disciplines and subjects and precise enough to allow subject-specific approaches at the same time.
- 6) Interoperability and integration facilitation with others by making available APIs, plugins, e.g. CORE, unpaywall, Huni, Biblissima, ORCID and DOI integration is also considered relevant.
- 7) Detailed filtering and sorting, weights terms, faceted search, metadata is important to expert users.
- 8) Avoid information overload by e.g. show search results progressively. Also, post-results retrieval functionalities to support the users to deal with the size of the search results set may be very useful, especially for non-expert users.
- 9) Make use of AI technology to provide key features that increase the platform appeal and desirability. Next, we present in more detail four features that were considered good AI applications. First, take as an example the Iris.ai platform, which allows users to start a search with a problem statement instead of search terms. Figure 15 depicts Iris.ai platform screens showing the focusing study feature, which starts with the definition of the problem statement (top). The platform supports the user in the organisation of the study in several stages. For example, in stage 1 the user is able to select key concepts for the study. Lists of

included and excluded concepts are suggested automatically based on the problem statement (bottom).

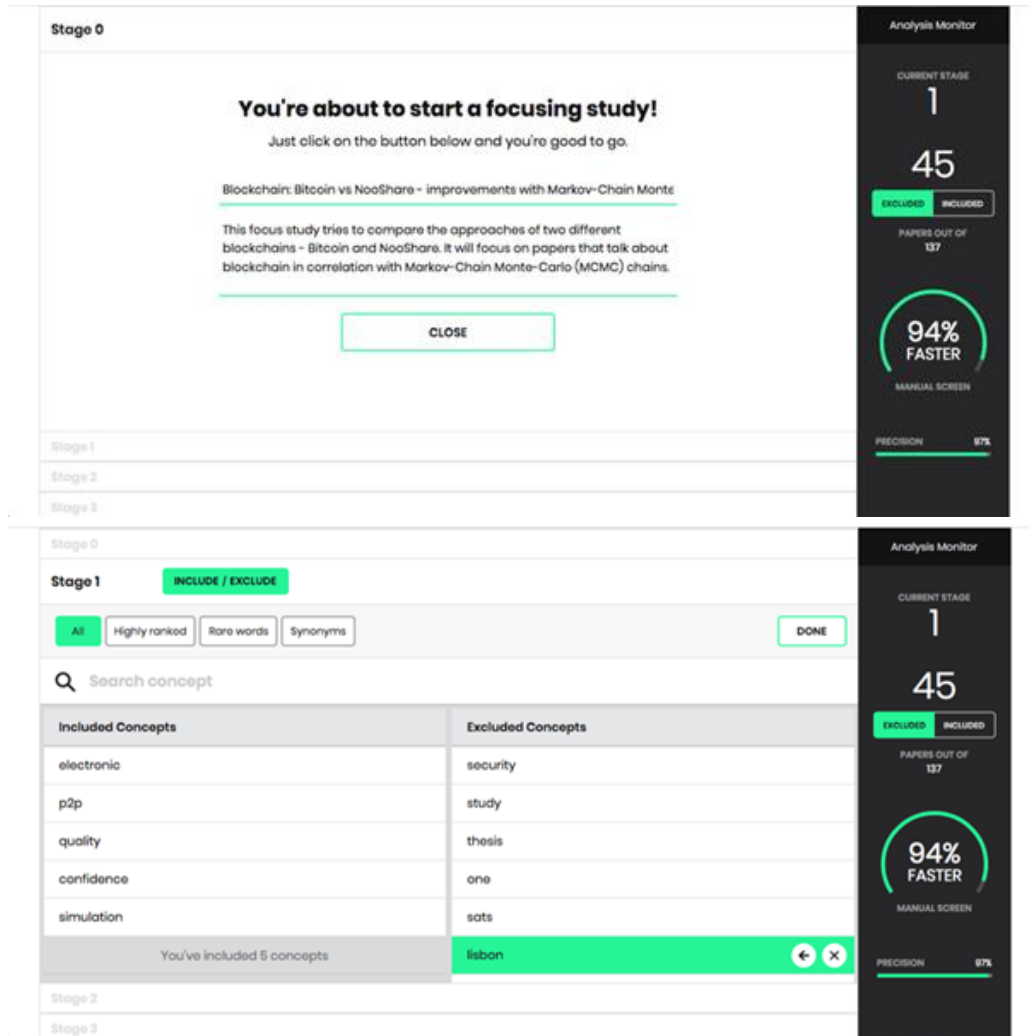


FIGURE 15: IRIS.AI PLATFORM SCREENS SHOWING THE FOCUSING STUDY FEATURE TO ILLUSTRATE THE FIRST TWO STEPS OF THE PROCESS: PROBLEM STATEMENT (TOP) AND STAGE 1 (BOTTOM)

Second, Academia.edu recently made a feature available which allows users to access a 5 minutes overview of a paper. Figure 16 depicts an example of such an overview, which presents a paper summary, an evaluation of the most important sections of the papers, and the top 10 takeaways from the paper. A quick overview of RO seems to be a very attractive feature, since it allows users to save time in the selection of relevant RO.



FIGURE 16: ACADEMIA.EDU - 5 MINUTES OVERVIEW OF A PAPER

Third, Semantic Scholar is an AI-powered search and discovery tool that uses machine learning techniques to offer insights to help scholars quickly gain an in-depth understanding. Figure 17 depicts an example of the new Research Feed feature (beta version), which learns what papers are most relevant to the user, and adapts the research feed to help the user stay up-to-date with research posted on ArXiv in the last 3 months.

FIGURE 17: SEMANTIC SCHOLAR - RESEARCH FEED FEATURE

Fourth, Jstor provides the Text Analyzer (beta) feature, which allows users to search for articles and books, simply by dragging and dropping a document or image, or paste text from an article. Figure 18 shows the result page provided by the Text Analyzer feature, which allows the user to manage the search terms and their weight in the search, and extracts topics, people, locations, and organisations.

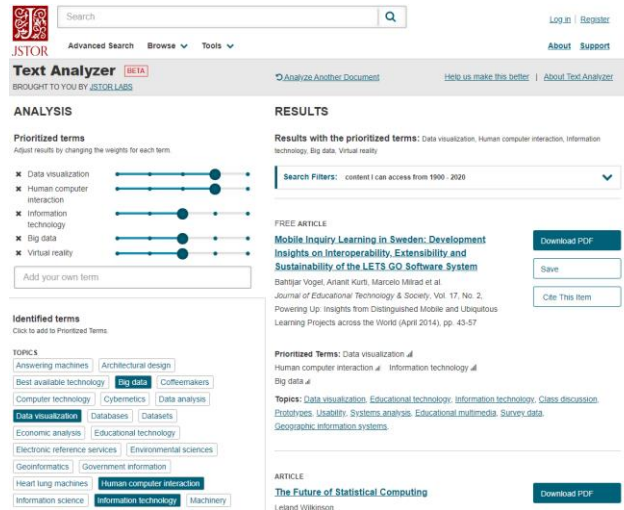


FIGURE 18: JSTOR - TEXT ANALYZER

10) Features that promote networking and collaboration work seem to be very appealing for researchers, given the popularity that platforms such as Researchgate, Academia.edu, and Mendeley have. Examples of such features are: researcher profile and alerts, RO’s analytics, researchers’ analytics, analytics dashboards (e.g., Frontiers, Researchgate, Academia.edu, Iris.ai), lightweight relevance check before publishing in the community – not peer review (arXiv.org).

#### 4.2.4 Organisation & Financing

Regarding forms of organisation our analysed sample shows a very broad spectrum of opportunities. In our analysis we distinguish basically between “non-profit” and “for-profit” organisations. As shown in Figure 19, most of the non-profit ones are structured as independent associations or are a part of institutions (mostly related with universities). Organisations in form of projects and start-ups are more rarely.

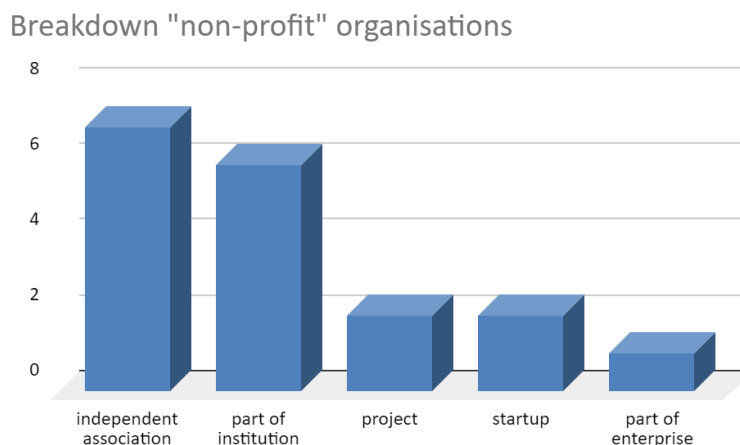


FIGURE 19: BREAKDOWN OF NON-PROFIT ORGANISATIONS

For-profit organisations are divided rather evenly into three different organisation forms, as enterprises, part of enterprises and start-ups (see Figure 20).

### Breakdown "for-profit" organisations

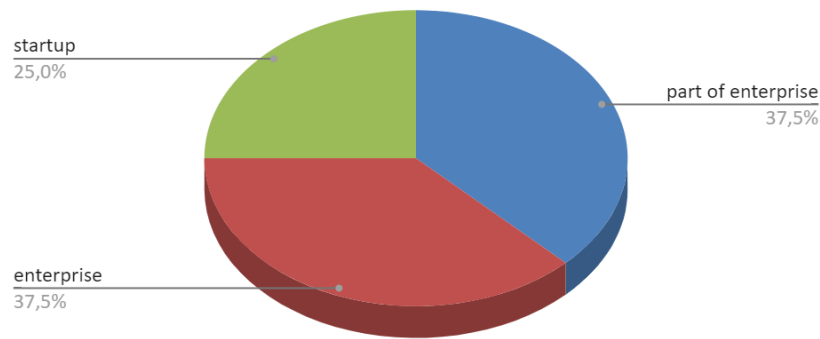


FIGURE 20: BREAKDOWN "FOR-PROFIT" ORGANISATIONS

Similar to the forms of organisation, the picture in terms of financing is also diverse (see Figure 21). Different forms of funding (public, private, institutions) are the dominant income stream for the analysed services, followed by revenues out of paid services and cross financing. Also important financing sources are membership fees, premium subscriptions and donations. Less common are partner contributions, advertisements and sponsorships.

### Breakdown financing opportunities

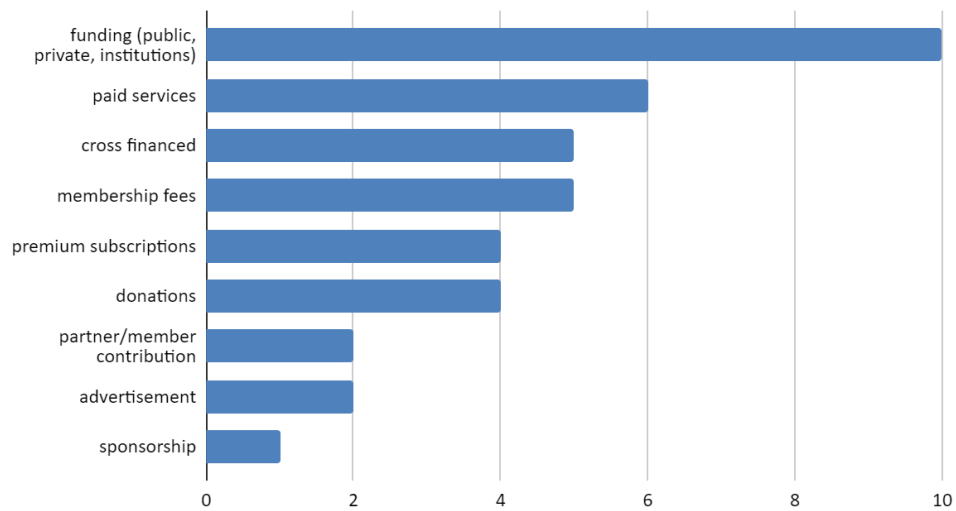


FIGURE 21: OVERVIEW ON FINANCING OPPORTUNITIES



For our future TRIPLE platform it is a positive signal to see the variety of financing possibilities. The final decision for financing depends on the services offered and the customer groups addressed, but also on the chosen form of organisation for the operation of the platform.

### 4.3 Conclusion and relevance for TRIPLE

The main competitors have an established presence in the market, and the brands are well known. We need to pay the most attention to platforms such as Frontiers, Lens.org, Academia.edu, ResearchGate, Iris.ai, due to their innovation strategy and constant release of new innovative features. However, we were unable to identify very successful platforms which target specifically the SSH community.

Looking at the products and services provided by the competitors, we recognize that the annotation tool and the visual discovery feature represent unique features that will distinguish TRIPLE from the competition. In addition, TRIPLE should offer features that proved to be appreciated by users in the competitor's platforms. A good example is the "5 minutes overview" feature recently released by Academia.edu, which allows a simple and much quicker way to evaluate the relevance of a research paper. This feature was deemed as desirable by both academics and especially non-academics in the interviews carried out within TRIPLE work package Co-design and user research (WP3). Other examples are mentioned in the competitor's analysis. Regarding usability and user experience, we provide a summary of good practices and examples of things to avoid.

## 5 | EXPERT INTERVIEWS

In order to complement the insights gained from the web-based competitor analysis, the Exploitation and Sustainability WP (7) research team collected qualitative data through an interview study with general Open Science Experts and executives from existing Open Science platforms. The main objectives of the interviews are:

- to get information at first hand from the Open Science business environment (market needs, cost drivers, income streams)
- to gain knowledge on strength & weaknesses of existing services
- to get insights on success factors (difficulties, barriers, pitfalls) for build-up and operation of OS platforms.

The interview results should provide valuable feedback for the planned range of TRIPLE functions and features on the one hand and input for the development of a viable business model on the other.

The qualitative interviews were designed as guideline-based expert interviews. Despite the similarity of our interview target groups, 2 different interview guidelines (due to different question depths) had to be created (see appendix 2). The recruitment of the interview partners was carried out by the Exploitation and Sustainability WP (7) project partners. All in all, nine interviews (three with OS experts, six with executives of OS services) were conducted personally (face to face or video calls) and lasted on average 30 minutes. Interviews were evaluated through qualitative content analysis.

### 5.1 Interview results: Open Science general experts

The first block of questions deals with customer needs and potential user groups for new OS services. The consensus opinion of the experts is that there are already many services available but there are still niches and user groups which could be addressed. The following examples were given: there is a need for outreach tools, annotation support, interdisciplinary search for data and tools, addressing young scholars and citizens. For policy makers, a kind of executive summary from trusted sources was mentioned. In the following, we present some meaningful quotes.

*“There are already a lot of things out there but in any case, I would like to see a ‘real’ competitor to available closed platforms with outstanding usability and enriched results (not just search hits)” (expert 1)*

*“Look first at the problem that needs a solution, then you can see what is needed” (expert 3)*

In terms of what an OS platform or service has to offer to retain users/customers in the long term, the following answers were given:

- offer a service that people want, deliver on user needs
- finding new ways of getting credits (citations, reads, etc.)
- offer meaningful social features
- offer easy access to the service e.g. via a browser plugin
- provide regular updates
- provide user support (helpdesk)
- transparency is important

The next part of the interviews covers financial topics regarding costs and revenues. Personnel costs were mentioned as the main cost factors for both development and operation. In the build-up phase costs are seen strongly allocated on IT and software development side. Regarding operation, the main costs tend to concern customer service, maintenance and marketing. Marketing and communication are seen as crucial to reach users and make them aware of the Unique Selling Proposition (USP) of the offered service.

On the revenue side, the experts see sustainable funding (national, EU, institutions) as a major income stream for OS platforms or services. Willingness to pay for “premium” services is seen as quite low due to the fact that users from OS services expect everything for free. In addition to funding, the following revenue streams were also mentioned: member fees, subscriptions, service fees, consultancy, conference income and in-kind contributions.

*“If you offer an extremely cool ‘high value’ services, maybe enterprises or policymakers could be paying customers.” (expert 1)*

With the last block of questions, we wanted to gain insights into success factors (difficulties, barriers, pitfalls) for the build-up and the operation of OS services. One mentioned that the main challenge was to build up a stable growing user base. To achieve that, a communication and dissemination strategy, from the earliest beginning to the operating phase, is crucial. Experts recommend that good communication with all partners involved in the OS platform/service must be maintained all the time on a regular basis. Another mentioned challenge was to find a way to maintain operations after the initial funding provided by Research Funding Agencies ended. The following success factors were also stated:

- get or provide quality data (if data are junk, your service results are also junk)
- take care of a well-planned and structured project management
- demonstrate that you know the user
- understand your community and know the landscape

## 5.2 Interview results: Open Science service provider

The first block of questions covers the topics of addressed user groups, offered service and provided USP. Researchers and students are the main user group for most of the interviewed OS service providers followed by companies and higher education institutions. Some mentioned also libraries, research funders and data providers as addressed users. The offered services cover the whole spectrum of scholarly communication. The stated USP of the services include terms like “the largest ...”, “global unique provider of ...”, “offer more than X millions of ...”. Most of the providers highlight their services as all open and free, fully supported, easy to use and covering all disciplines. An interesting statement or advice of an interview partner was to offer for every user group a concrete defined service and benefit.

In terms of how to keep the users motivated to use the offered service frequently, the following statements were given: if it is perceived as useful, people will use it; make it as easy as possible; help researchers to gain visibility (impact statistics). When we ask about the strengths and weaknesses of the services we received the following replies.

Strength: provide central access, high visibility, global and diverse, offering the same features as commercial players, offering unique services/better features than commercial players

Weaknesses: low quality of metadata, general lack of common practices (use of semantic links, broken APIs, etc.), very thinly stretched in terms of organization and financial resources, difficult to be comprehensive, maintaining older platforms is a challenge.

Regarding cost factors, we found a similar picture as in the interviews of the OS experts. The main cost factor for build-up and operation of services are personnel costs (estimates ranges from 70%-90%) for software development, maintenance, back office, editorial work and user support. The rest is split up on IT infrastructure (storage, computing power). A differentiated picture emerges in relation to revenue sources. Apart from the main revenue source of funding (national & EU funding, R&D grants, project co-funding), many other sources were mentioned:

- contracts with institutions (universities, libraries) and initiatives
- contracts with companies
- in-kind exchange of resources (mainly data)
- in-kind contribution from institutions (universities, libraries)
- supporting memberships and sponsorships
- various kinds of donations from unis, libraries, publishers and aggregators
- 2 out of 6 OS providers offer paid services

As a result, funding partners, technical partners, data provider/repositories and network partner (universities, libraries, publishers) are of high importance for OS providers.

The questions on success factors and challenges provided key input for the TRIPLE project. Replies ranged from needed skills and methods to finance and advice for the service offerings and such as:

- focusing on a few concrete objectives and killer applications.

- following a user-centred approach, e.g. always have the user in mind
- the need for a motivated team with a broad variety of competencies
- finding a balance between set up of the team and getting the needed funding
- offer a broad diversity of services with respective revenue streams
- branding is key

In terms of barriers and challenges we noted the following statements: struggling to get funding, no business set up - led by part-timers, cross-national and cross-language collaboration.

The last question was “if you could start all over again, what would you do the same or different?” Most of the interview partners said they would do some things the same and of course some things differently, e.g. focus on customer needs much earlier, be quicker in implementation, have a clear focus on technical development. Finally, we would like to mention a few meaningful quotations.

*“I would do better to make sure that the funding pipeline is always well filled” (OS provider 3)*

*“Getting a first working version that matches what is minimally needed up and running quickly and then iterating on the functionality based on user feedback and operational experience” (OS provider 1)*

### 5.3 Learnings for TRIPLE

The interview results of OS experts show that despite the many platforms and services available, there are still market niches and user groups which are underrepresented. Important advice was, to first look at the problems and needs and then create an appropriate solution. The answers regarding frequent use can be summarised as follows: offer a highly useful and easy to use service. In terms of cost factors for build-up and operation of an OS service, both interview groups mentioned personnel costs as most relevant. A very broad picture emerges regarding the possible revenue sources. Besides any kind of funding, there are numerous other possible revenue sources we should consider or examine for TRIPLE. Concerning success factors, we got very helpful tips ranging from needed skills and methods to finance and advice for service development.

As a result of this chapter we would like to conclude with 2 questions that we as a consortium should keep in mind:

- What can TRIPLE do better than Google (Scholar) or ResearchGate?
- How can TRIPLE ensure that it remains flexible, open and responsive to its users?



## 6 | SWOT ANALYSIS

SWOT (strengths, weaknesses, opportunities, and threats) analysis is a framework used to evaluate an organisation's competitive position and to develop strategic planning. SWOT analysis assesses internal and external factors, as well as current and future potential. Strengths describe what an organization excels at and what separates it from the competition. Weaknesses stop an organization from performing at its optimum level. They are areas where the business needs to improve to remain competitive. Opportunities refer to favourable external factors that could give an organization a competitive advantage. Threats refer to factors that have the potential to harm an organization. Strengths and weaknesses are frequently internally-related, while opportunities and threats commonly focus on the external environment.

Within the TRIPLE project we use the SWOT analysis to derive strategic directions and get first building blocks for a sustainable TRIPLE business model. In order to get the appropriate input for the four SWOT categories, the WP7 team discussed below questions for each category within WP7 coordination calls. The results of this process are shown in Table 5.

Strengths:

- What can we do better than anyone else?
- What advantages does TRIPLE project (our future service) have?
- What assets do we have in TRIPLE consortium (knowledge, network, skills, technology)

Weaknesses:

- What could we improve, what is difficult?
- What should we avoid?
- Are there any additional assets that we need (technology, skills)?
- What could TRIPLE stakeholders see as weaknesses?

For the external categories Opportunities and Threats, valuable input is already provided by the Competitor Analysis and the PESTLE Analysis. For further inputs below questions were helpful.

Opportunities:

- Which trends are favourable for TRIPLE platform?
- Are there any changes in technology, market or legislation that we could benefit from?
- What future opportunities are foreseeable?

Threats:

- What are our competitors doing?
- Are there any market trends that could become a threat?
- Is user behaviour changing in a way that could negatively impact our future service?

TABLE 5: SWOT ANALYSIS

<p><b>STRENGTH</b></p> <ul style="list-style-type: none"> <li>- highly diverse (disciplines, type of partners, gender balance) and skilled team</li> <li>- stable financing for 42 months</li> <li>- large network through partners, multiplier through EU projects</li> <li>- well embedded in OS research</li> <li>- 3 big RI in consortium incl. EGI</li> <li>- well organised (management, relationship) and experienced</li> <li>- good team spirit</li> <li>- rely on existing technologies (isidore, pundit)</li> <li>- strong focus on innovation</li> <li>- in line with EOSC developments</li> <li>- good fit with EU ICT development landscape</li> </ul>	<p><b>WEAKNESSES</b></p> <ul style="list-style-type: none"> <li>- large consortium → slow, different interests</li> <li>- tight corset through grant agreement</li> <li>- multilingualism</li> <li>- remote working (project team spread across Europe)</li> <li>- lack of previous experience in working together.</li> <li>- low visibility due to SSH not seen as hot topic</li> <li>- sustainability</li> </ul>
<p><b>OPPORTUNITIES</b></p> <ul style="list-style-type: none"> <li>- EC committed to OS, pan-European research and support of diversity</li> <li>- Increasing amount of people working in Research</li> <li>- Increasing amount of people with tertiary education</li> <li>- lack of dedicated SSH OS services</li> <li>- lack of visibility for SSH publications</li> <li>- reach wider audience (policy makers, SME) with SSH research</li> <li>- transition (from traditional to digital) to new OS services for SSH</li> <li>- interdisciplinary research (overcome silo effect)</li> <li>- AI / Machine learning is raising up</li> <li>- Rising gross domestic spending on R&amp;D</li> </ul>	<p><b>THREATS</b></p> <ul style="list-style-type: none"> <li>- fast moving existing and new competition (agile)</li> <li>- negative effects of corona pandemic (on our project, on the economy)</li> <li>- Lack of recognition of SSH</li> <li>- Lack of clarity for the future of EOSC?</li> <li>- Various legal requirements (GDPR etc.)</li> <li>- Reduced public spending on tertiary education</li> <li>- Multiple country specific legal requirements (GDPR, etc.)</li> </ul>

Subsequently, we would like to highlight the connection between strengths and weaknesses on the one hand and between opportunities and risks on the other. Depending on which characteristics of the project are associated with selected features of the environment, general directions can be derived for strategic planning.

The following questions can help to identify interconnections:

How can we use our strength to balance our threats and weaknesses?

The threat risk of existing and future competition can be mitigated by our stable financing over the next three years as well as our highly diverse and skilled consortium partners. Furthermore we can rely on existing state-of-the-art technologies brought in by our partners. Our close coordination and integration within EOSC helps us be prepared for its future developments. We address our weaknesses of being a large consortium with limited ability to react quickly, with an outstanding and carefully monitored project organisation, stringent project management and great team spirit. Our strong focus on innovation helps us to cope with the tight corset of the Grant Agreement.

Which strengths suit which opportunities? How can our strengths be used to best seize our opportunities?

With the newly developed TRIPLE SSH discovery platform we can address a wide range of identified potential opportunities such as increase the visibility for SSH publications, reach a wider audience (e.g. policy makers, SME, science journalists), fill the gap for dedicated SSH Open Science scholarly communication service. Through our large and diverse network of partners and integration in various EU projects we are able to disseminate our work to new user groups and support interdisciplinary research.

Where can weaknesses be turned into opportunities? How can weaknesses be developed into strengths?

A stringent and result oriented project management and our good team spirit help us to overcome the challenges in working together remotely in a multilingual environment. Our diverse (disciplines, type of partners, gender balance) and large consortium and the resulting interdisciplinarity is a good prerequisite for the development of innovations.

The initial SWOT analysis carried out shows first insights on where we are good, what we're lacking, to minimize risks, and to take the greatest possible advantage of chances for success. In the further course of the project, we need to update and re-assess these findings regularly and derive the right future strategies.

## 7 | CONCLUSION

Within the present report, we provide the foundation for TRIPLE's exploitation strategy and TRIPLE's business model. By applying a broad mix of methods and tools we gained insights into relevant stakeholders, existing competition, the business environment, a first strategic orientation and derived recommendation for the future project work.

From stakeholder analysis, we gained information about the stakeholder roles and needs as well as indications on their power and interest. Out of that data, we derived management strategies for specific stakeholder groups. Our main conclusion can be summarised as follows. We identified a wide variety of relevant stakeholders which requires different management. At this stage of the project we need to focus on our potential main user groups which we would like to actively involve into our co-design processes. In the next step, we should find out which service offer (bundle of features and functions) fits best to which user group. We definitely need further investigation in terms of communication and engagement for all other identified stakeholders. These outcomes should be summarised in a joint stakeholder communication roadmap in cooperation with the Communication and Dissemination WP (8).

From our conducted environment analysis (PESTLE) we got rich information on each of the six categories. From today's perspective, it is difficult to judge which of the positive or negative factors will have more significance in the future. The many positive factors in the field of technology should not obscure technical trends that can become relevant very quickly. The entire consortium and especially the technical project partners must keep a very close eye on them. In general, we need to be aware of the detected factors and some of them need constant monitoring.

The competitive environment can be summarised as strong & divers.

- Strong: in terms of experience & maturity, widely known (brand awareness), financial background
- Divers: from domain-specific to all-rounder, from basic features to AI-powered features, different organisation forms & financing opportunities

The main competitors have an established presence in the market, and the brands are well known. However, we were unable to identify very successful platforms which target specifically the SSH community. Looking at the products and services provided by the competitors, we recognize that the annotation tool and the visual discovery feature represent unique features that will distinguish TRIPLE from the competition (see table 4). Moreover, the competitor analysis offers a lot of ideas and inspiration from "good practices" and examples for "things to avoid". We need to pay attention to platforms such as Frontiers, Lens.org, Academia.edu, SemanticScholar, Iris.ai, due to their innovation strategy and constant release of new innovative features. The following recommendations can be derived from the competitor analysis:

- provide a unique, useful and easy to use service bundle for each user group
- follow consequently a user-centered approach



Finally, the conducted SWOT analysis shows first insights on how we can use our strength to balance our threats and weaknesses, to minimize risks, and to take the greatest possible advantage of chances for success.

The results of this report are intended to provide further building blocks for the development of a desirable, viable and buildable TRIPLE platform.

## 8 | REFERENCES

- [1] Brown, T. (2008). Design thinking. *Harvard Business Review*, 86(6), 84.
- [2] Cooper, A., Reimann, R., & Cronin, D. (2007). *About face 3: the essentials of interaction design*. John Wiley & Sons.
- [3] Schmeer, K. (2020, April 20). Stakeholder-Analysis Guidelines. Retrieved from: <http://www.manager-wiki.com/externe-analyse/32-stakeholder-analyse>
- [4] Ackermann, F., Eden, C. (2011). Strategic Management of Stakeholders: Theory and Practice. *Long Range Planning*, Volume 44, Issue 3, Pages 179-196.
- [5] What is PESTLE Analysis? A Tool for Business Analysis (2020, April 21). Retrieved from: <https://pestleanalysis.com/what-is-pestle-analysis/>
- [6] OECD (2020), Public spending on education (indicator). doi: 10.1787/f99b45d0-en (Accessed on 03 April 2020)
- [7] OECD (2020), Gross domestic spending on R&D (indicator). doi: 10.1787/d8b068b4-en (Accessed on 03 April 2020)
- [8] OECDa (2020), Spending on tertiary education (indicator). doi: 10.1787/a3523185-en (Accessed on 03 April 2020)
- [9] OECD (2020), Population with tertiary education (indicator). doi: 10.1787/0b8f90e9-en (Accessed on 03 April 2020)
- [10] OECD (2020), Researchers (indicator). doi: 10.1787/20ddfb0f-en (Accessed on 03 April 2020)
- [11] SWOT Analysis - How to Develop a Strategy For Success (2020, April 22). Retrieved from: [https://www.mindtools.com/pages/article/newTMC\\_05.htm](https://www.mindtools.com/pages/article/newTMC_05.htm)

## APPENDICES

### Appendix 1: Competitor Analysis Template

Description Platform XYZ

#### BASIC DESCRIPTION

<b>Platform Name</b>		<b>Platform Logo</b>	
<b>Site URL</b>			
<b>Origin of platform provider/operator?</b>			
<b>Short description of platform (Mission, Vision, ect.)</b>			
<b>Overview on Offerings (Services, Products, Features, Functions)</b>			
<b>Size of the platform?</b> (Number of users / documents etc.)			
<b>Focus</b> (regional, geographic, specific research domains or target groups, language versions?)			

<b>Organisation Insights (board, team, legal form etc.)</b>
<b>Finances (type of revenue streams, budget figures, cost factors)</b>
<b>Marketing / Dissemination</b>
<b>Partners &amp; Stakeholders</b>

#### DETAILED CONTENT DESCRIPTION

<b>Most relevant functions and features</b> Please indicate main functions & features and describe with screenshots and short explanations.
<b>Value adds of platform for stakeholders?</b> What feature/function is unique/outstanding? What add on benefits do the platform offer? How would you describe the USP (Unique Selling Proposition) of the platform?

#### USABILITY/UX

<b>Clearly and understandable symbols and wording?</b>
--



<b>User Orientation</b> Can I navigate within the platform with relative ease?
<b>Design of user interface</b> Clear arranged, not confusing. Is the interface well organized, logically laid out, ease to navigate – or is it the opposite (cluttered, illogical, complicated)?
<b>User motivation</b> Are users motivated to use the platform more often, if yes, how?
<b>Learnings concerning usability/UX for TRIPLE</b> What should we transfer to TRIPLE, what should we avoid?

**SUMMARY & CONCLUSION**

<b>Strengths</b>	
<b>Weaknesses</b>	
<b>Personal rating</b> (1 = very bad, 10 = best in class)	
<b>Relevance for consideration within TRIPLE</b> What can we learn or should take into consideration for TRIPLE Platform	

## Appendix 2: Expert Interview Guidelines

1) Interview Guideline for OS experts who have **established and/or operate** a platforms/service

### Introduction

We invite you to help us with the research for the project TRIPLE. We are aiming at interviewing a number of experts who have established or operate OS platforms/services or have a broad experience in the field of OS services.

Our project deals with Social Sciences and Humanities (SSH) research and our goal is to build a digital platform supporting researchers with the discoverability of new data, projects and collaborators.

The interviews will help us better understand the success factors and barriers in developing and sustainable operation of an OS platform or service.

Your data will be stored in a pseudo-anonymized form and will only be accessible to the research partners of TRIPLE. Your information will be treated strictly confidential and it is not possible to trace it back to individuals.

The semi-structured qualitative interview will take about 20-30 minutes.

1. How would you explain your OS platform/service to a clueless person?
2. What user/customer groups do you address?
3. What concrete service do you offer your specific user/customer group? What is the main benefit for each user/customer group?
4. How would you describe the USP (Unique Selling Proposition) of your OS platform/service? What is the “killer feature/function” of your OS platform/service?
5. What motivates users/customers to use the platform more often/frequently?
6. What are the strength and weaknesses of your platform/service?
7. What are the main cost factors of your OS platform/service (differentiation btw build-up and operation)?
8. How do you finance your OS platform/service? What are the main revenue streams? Do you offer paid services? If yes, what kind of paid services?
9. Who were/are the most important partners for the build-up and running your OS platform/service.
10. Which services (development, support, hosting etc.) are provided in-house, which are outsourced? What is the ratio between in-house and outsourced services? (rough estimation in %)
11. What “success factors” are important in building up an OS platform/service? What are the difficulties, barriers or pitfalls when building up the OS platform/service?

12. If you could start all over again, what would you do the same or different?

1) Interview Guideline for OS **general experts** who have broad experience in the field of OS services

### Introduction

We invite you to help us with the research for the project TRIPLE. We are aiming at interviewing a number of experts who have established or operate OS platforms/services or have a broad experience in the field of OS services.

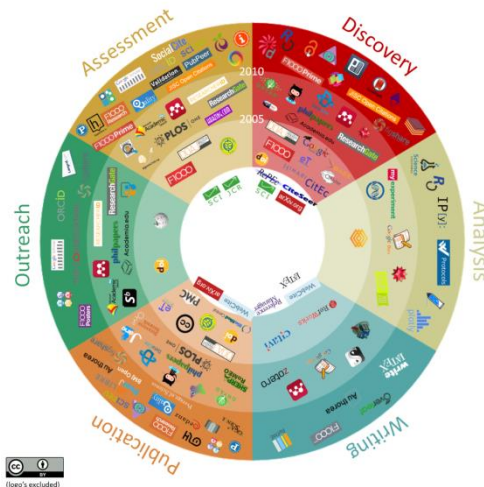
Our project deals with Social Sciences and Humanities (SSH) research and our goal is to build a digital platform supporting researchers with the discoverability of new data, projects and collaborators.

The interviews will help us better understand the success factors and barriers in developing and sustainable operation of an OS platform or service.

Your data will be stored in a pseudonymised form and will only be accessible to the research partners of TRIPLE. Your information will be treated strictly confidential and it is not possible to trace it back to individuals.

The semi-structured qualitative interview will take about 20-30 minutes.

1. How would you explain an OS platform/service to a clueless person?
2. In what areas of the research lifecycle (see pic below) do you see a need for a new innovative OS platform/service?



3. What feature/function do you miss in the actual landscape of OS platform/services?
4. If you would develop a new OS platform/services what user/customer groups would you primarily address and why? Do you see under-represented user/customer groups in OS
5. What would an OS platform/service have to offer to retain users/customers in the long term?

6. What are the main cost drivers/factors in the development phase of an OS platform/service? What are the main cost drivers/factors in the operation phase of an OS platform/service?
7. What income streams do you see for an OS platform/service? What are the main revenue streams? Would you offer paid “premium” services? If yes, what kind of paid services do you have in mind?
8. Who were/are the most important partners for the build-up and operation of an OS platform/service.
9. Which services (development, support, hosting etc.) should be provided in-house, which can be outsourced? What is a “healthy” ratio between in-house and outsourced services?
10. What “success factors” are important in building up an OS platform/service? What are the difficulties, barriers or pitfalls when building up the OS platform/service?