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Stakeholders, Technical and Financial Evaluation

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Executive Summary

The current deliverable presents a multi-facet evaluation of the project's results during the first year covering 3 different perspectives. First, we have collected and analyzed feedback from all stakeholders of the OpenScienceLink ecosystem, including researchers, scholars, universities, research organizations, research sponsors, funding agencies, funding authorities and the media. To this end, the project exploited several modalities including questionnaires, interviews, satisfaction surveys and other tools that were specified as part of the project's evaluation framework. At a second level, we present evaluation of the project's platform and services from a technical and technological perspective in terms of performance, scalability, expandability, robustness, novelty and technological longevity. The third part is devoted to the business and financial evaluation of the OpenScienceLink services, according to the different business models for open access that were studied in WP9. In general this task provides insights for the formulation of realistic business and sustainability plans. As a result, the current deliverable is structured following the aforementioned rationale, presenting analytically the results of evaluation based on the tools and methodologies (questionnaires, interviews,Key Performance Indicators (KPIs), measures etc) that were defined at deliverable 8.1.

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1 Introduction

1.1 Objectives of Evaluation

This task gives emphasis on the multi-facet evaluation of the project's results (i.e. covering multiple perspectives), as well as on the elicitation and documentation of best practices associated with open access to scientific information. The main objectives of the evaluation process are to:

Establish an evaluation framework (including scientifically sound methodologies, KPIs and tools) for the disciplined evaluation of the project's results.

To evaluate the project's results with the involvement of all stakeholders of the OpenScienceLink platform i.e. taking into account and analyzing feedback from all stakeholders.

To evaluate the OpenScienceLink from a technical and technological perspective.

To evaluate the OpenScienceLink results against their business potential and the possibility of rendering financial returns/benefits for the various stakeholders.

To elicit and document best practices and blueprints associated with the implementation, exploitation and use of models for open access to scientific information.

OpenScienceLink will also study the business potential of open access paradigms, through investigating and pursuing multiple business models including author fees, hard copy sales, advertisements, sponsorships, as well as subscription based models.

1.2 Evaluation Methodology

The evaluation methodology includes a set of methodological tools tools and KPIs for evaluating the project from a usability, business and technical perspective, while at the same time eliciting and analyzing the opinion/feedback of all stakeholders.

Key Performance Indicators are arguably an important instrument for monitoring the project's work and evaluating the results. Taking into consideration four main perspectives (Mission perspective, resource perspective, Internal Business processes, Learning & Growth perspective), we have composed an expansive list of KPIs for each of the pilots as well as the overall OpenScienceLink platform. In addition to the KPIs, the different aspects of the OpenScienceLink project are evaluated using ***questionnaires***, ***review forms*** and ***stakeholder interviews***.

2 Stakeholders Evaluation

In order to get detailed feedback from stakeholders about their satisfaction with the performance of the project interviews were conducted by consortium members. In addition to the evaluation of individual subjects multi-purpose methodologies included questionnaires (for all subjects), as well as key performance indicators and related measures specifically for the OpenScienceLink platform and its pilots.

Overall, there are three basic subjects of evaluation within OpenScienceLink. First, the **management of the project and the overall execution** of the workplan, including the timely achievements of the predefined milestones. Second, the **OpenScienceLink platform**, which has the main role to implement the five project pilots. Third, the performance and the outcome of the actual **OpenScienceLink pilots**.

2.1 Management and Overall Progress of the Project

With regards to the evaluation of the OpenScienceLink project execution, and based on the description of work of the project (OpenScienceLink Consortium, 2013), the major properties that were monitored pertain to the evaluation of the timely completion and submission to the EC of reports and deliverables, as well as the achievement of the project's milestones. In addition, the overall monitoring of the management of the project, e.g., financial management, distribution and organization of work, organization of project meetings, is also an important property.

There are many ways to measure the performance of the OpenScienceLink services directly using data that can be collected automatically while running the platform (e.g., the number of users). However, there are also “softer” criteria, e.g., relating to the quality of the user experience or the overall satisfaction with the project’s progress, that can not be measured as easily. In order to be able to also measure such criteria, we have designed online questionnaires that can be submitted to users of the different functionalities in order to provide them with a fast and easy way to provide feedback about their experience with the OpenScienceLink platform. This feedback is used by the technical partners for prioritizing required updates and designing the next iteration of the platform.

The first questionnaire was designed with the intention of measuring the internal satisfaction with the project’s progress among the members of the consortium. Most questions can be answered with a numerical value on a scale between 1 (“disappointing”) and 5 (“excellent”). The following questions followed this template:

- Please rate the overall progress of the OpenScienceLink project for the first year
- Please rate the overall management of the OpenScienceLink project for the first year
- Please rate the technical achievements of the OpenScienceLink project for the first year
- Please rate the quality control of the project deliverables for the first year
- Please rate the quality of the pilot specifications, including the elicitation of user requirements from all stakeholders
- Please rate the dissemination activities of the project for the first year, including the pilot preparation activities
- Please rate the exploitation plan and respective activities for the first year of the project

The results of the questionnaire are shown in the following chart. The values (x-axis) represent the weighted average of the responses by the questionnaire participants, where a value of designates the worst score, and the value of 5 the top (best) score. Overall, the internal evaluation via the questionnaire shows that within the first year the progress was satisfactory.

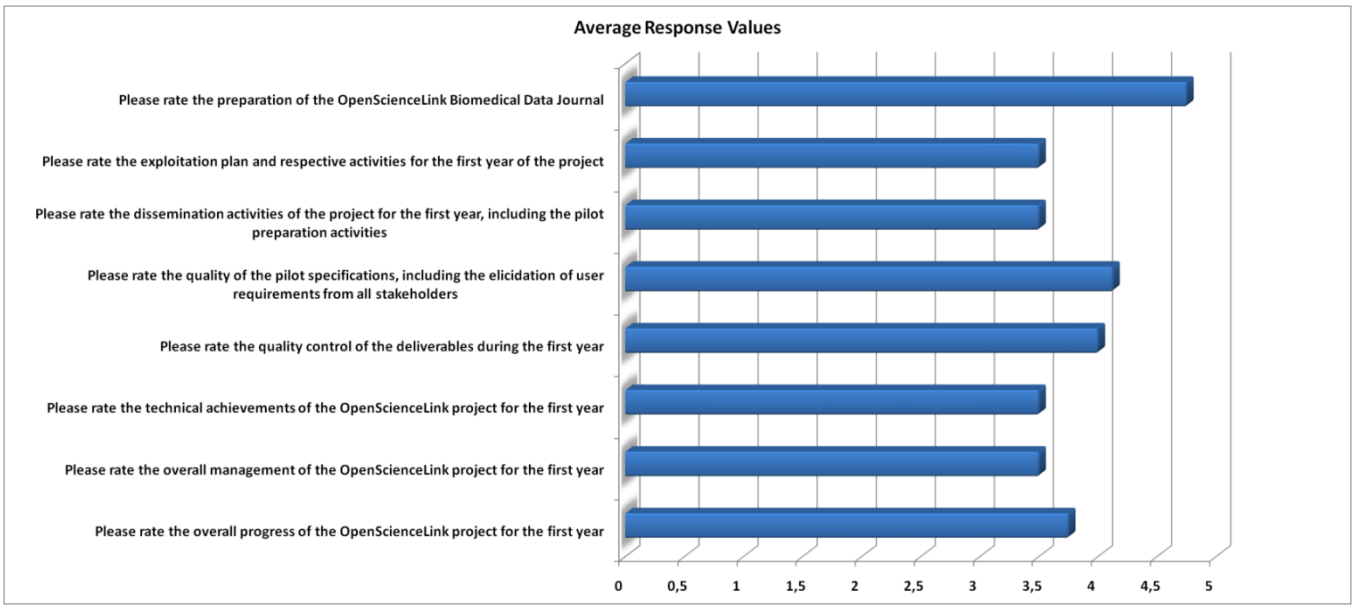

Figure 1: Summary of numeric questionnaire response values.

In addition to these questions that required numerical responses, the following two questions requested textual answers in order to retrieve in-depth feedback from the consortium members about which aspects of the project they consider most and least successful:

- Please enter three aspects of the project that you think were the major achievements during the first year
- Please enter three aspects of the project that you think can be definitely improved within the remaining of the project

The results of these two questionnaires are summarized in the following figures. As the results suggest, among the most important achievements in this first project period has been the development of the pilot specifications, the preparation and launching of the Biomedical Data Journal, and the actual alpha release of the OpenScienceLink platform (to become publicly available at: http://opensciencelink.org). In parallel, the participants to the questionnaire suggested that the dissemination efforts of the project and its results, the OpenScienceLink platform, and way resources are mobilized are among the most important aspects that can be improved.

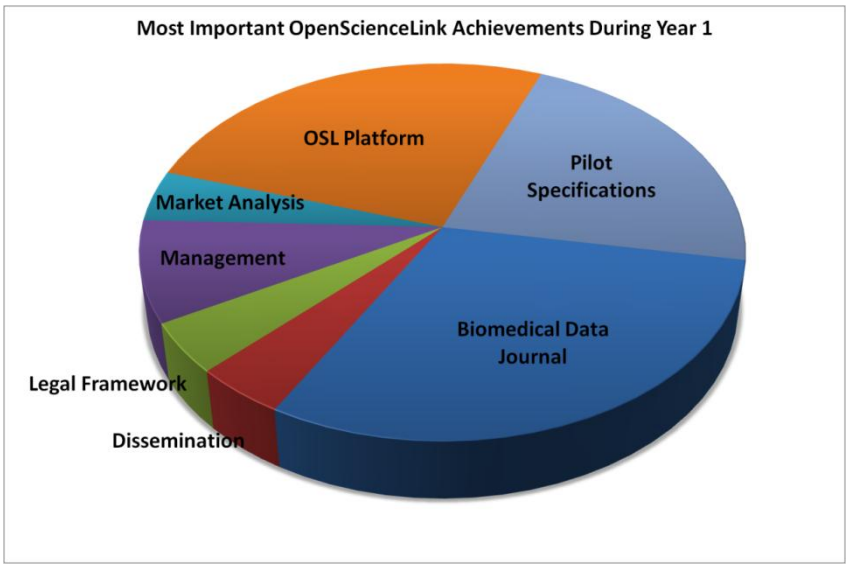

Figure 2: Summary of the most important OpenScienceLink project achievements according to questionnaire responses.

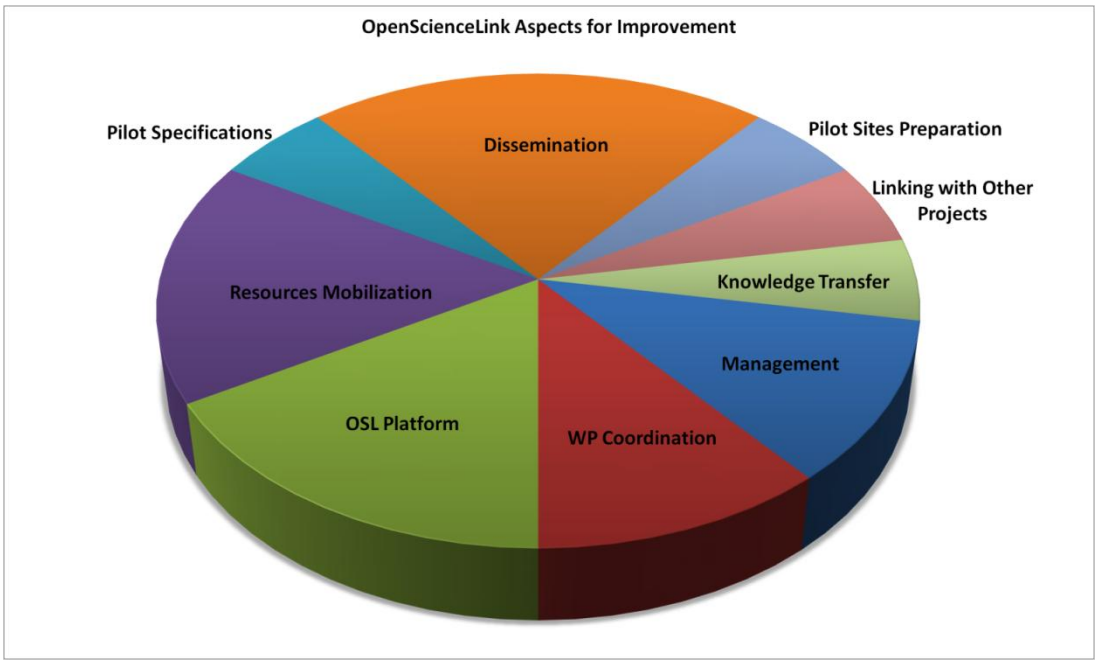

Figure 3: Summary of OpenScienceLink project aspects that can be improved according to questionnaire responses.

2.2 Evaluation of the Overall Platform's Performance

As far as the evaluation of the OpenScienceLink platform is concerned, the main properties that were monitored pertain to the technical aspects of the implementation and performance of the platform, the evaluation of the overall user experience, the degree of fulfilment of the collected user and technical requirements, and, the overall impact of the platform.

A questionnaire was designed with the intention of evaluating the first release of the OpenScienceLink platform (Year 1). The collected data covered the following evaluation aspects: platform as a whole, user satisfaction, novelty, and recommendations for future features. In the following we present the results of this evaluation.

2.2.1 Evaluation of the Platform as a Whole

For the purposes of the evaluation of the OpenScienceLink platform as a whole, the following questions were distributed to the partners:

Please give an overall rating for the OpenScienceLink platform as a whole.

Answer type: scale between 1 (“disappointing”) and 5 (“excellent”)

Please rate the functionality of Pilot 1, i.e., the upload of datasets and the overview of uploaded datasets.

Answer type: scale between 1 (“disappointing”) and 5 (“excellent”)

Please rate the functionality of Pilot 2, i.e., the creation of review calls.

Answer type: scale between 1 (“disappointing”) and 5 (“excellent”)

Please rate the functionality of Pilot 3, i.e., the analysis of trends for a given query.

Answer type: scale between 1 (“disappointing”) and 5 (“excellent”)

Please rate the functionality of Pilot 4, i.e., the suggestion of collaborations.

Answer type: scale between 1 (“disappointing”) and 5 (“excellent”)

Please rate the functionality of Pilot 5, i.e., evaluation of research entities.

Answer type: scale between 1 (“disappointing”) and 5 (“excellent”)

Please enter the three most positive aspects of the platform in its current form.

Answer type: text

Please enter the three aspects of the platform that you feel can be improved.

Answer type: text

The results of this evaluation are summarized in the following figure. The evaluation took place considering and testing the alpha release of the OpenScienceLink platform. With regards to the most positive aspects of the platform in its current form, the three major points were: simple and clear interface, fast response time, and, up-to-date results. Regarding the most important aspects of the platform that may be improved, these include: explanation or user guidance of the platform functionalities, more details in the explanation of the results, and, the suggestion that terms and conditions, especially with regards to the privacy policy, should be clarified.

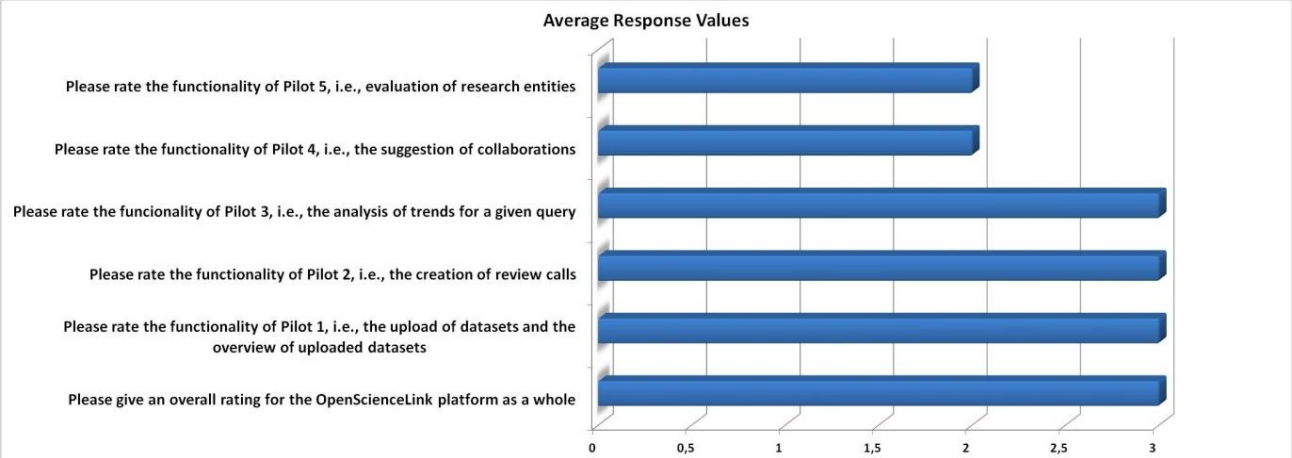

Figure 4: Evaluation of the OpenScienceLink platform (alpha release) as a whole.

2.2.2 User Satisfaction

How intuitive is the user interface of the platform in your opinion?

Answer type: scale between 1 (“Very unintuitive”) and 5 (“Very intuitive”)

Would you recommend the platform to colleagues?

Answer type: scale between 1 (“Not at all”) and 5 (“Absolutely”)

Will you use the platform again in the future?

Answer type: scale between 1 (“Definitely not”) and 5 (“Definitely yes”)

Please rate the platform's response time to your input.

Answer type: scale between 1 (“Very slow”) and 5 (“Very fast”)

The results of this evaluation are summarized in the following figure. The evaluation took place considering and testing again the alpha release of the OpenScienceLink platform. Overall, among

the most positive features is the fast response time of the platform, with the rest of the questions suggesting that for the official release there must be improvements in the user interface.

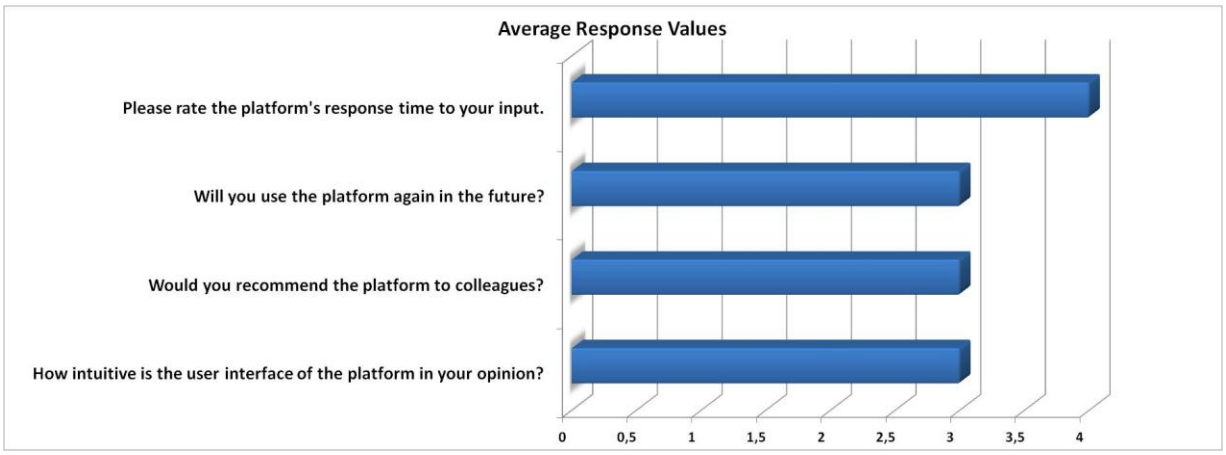

Figure 5: Evaluation of the OpenScienceLink platform (alpha release) user satisfaction.

2.2.3 Recommendations for Future Releases

Please enter the aspects of the user interface that can be improved.

Answer type: text

Please enter a wish list of functionalities you believe are interesting to be included in future releases.

Answer type: text

With regards to the aspects of the user interface that can be improved, based on the alpha release of the platform, the main suggestions were the following: (1) inclusion of help pages and user manual for the usage of the platform, (2) allow a more fine-grained customization of the users' profile creation, e.g., more specific categories that describe research interests, and, (3) provide an explanation of the results and the charts, especially for pilots 3-5, as the results are not so intuitive to interpret the way they are currently presented to the users. Regarding a wish list for future releases of the platform, the participants of the questionnaire requested a list of the most trendy research fields from all life sciences to be presented in pilot 3, and turning pilot 5 into a more interactive process, e.g., clicking on authors names or journals, and browsing the individual evaluation scores.

2.2.4 Novelty

Please enter the functions of the platform that you have not seen in any other related tool or engine.

Answer type: text

According to the participants of the questionnaire, the OpenScienceLink platform is a novel tool that combines many features which cannot be found as a whole in an existing platform or tool. However, for the individual pilots there are relevant tools and platforms, that have been

identified and have been compared with the OpenScienceLink platform (Andronikou, et al., 2013). Additional information exists at Section 4 of the current deliverable.

2.2.5 Key Performance Indicators (KPI)

This section describes the KPIs that were used for this purpose comparing the expected with the actual progress that has been achieved during the 1st year. Following the evaluation methodology adopted by the OpenScienceLink project, the KPIs have been grouped based on four perspectives: (1) Mission, (2) Resource, (3) Internal Business Processes, and, (4) Learning and Growth. The KPIs for the four perspectives, the anticipated progress for year 1, and the actual progress reported, are presented in the following four tables respectively.

KPI	**Measure**		
		Expected progress Year 1	Actual progress Year 1
User participation	Number of user registrations in the OpenScienceLink platform	-	**42** (consortium members for testing purposes)
Active user participation	Number of users using the system at least once per month within a 3 month period	-	**42**(consortium members for testing purposes)
Stakeholder participation	Number of institutions (beyond the consortium) involved in the OpenScienceLink pilot operations	-	**1** (SLUB from Dresden)
Funder participation	Number of research sponsors and/or funding authorities (beyond the consortium) involved in the OpenScienceLink pilot operations	-	**1** (SpringerOpen)
International participation	Number of countries from which the OpenScienceLink Platform has been used at least once	-	**6** (Germany, Greece, Belgium, Bulgaria, Lithuania, Italy)
Active international participation	Number of countries with active OpenScienceLink users (i.e., using the system at least once per month within a 3 month period)	-	**6** (Germany, Greece, Belgium, Bulgaria, Lithuania, Italy)

Research domain involvement	Number of Biomedical and Clinical Research areas (such as cardiology, pharmacology, etc.) with researchers registered to the OpenScienceLink platform	-	**22** (Genomics, Genetics, Computational Biology, Health Care, Metabolic Networks and Pathways, Allergy and Immunology, Cardiovascular Diseases, Sequence Analysis, Neurobiology, Clinical Trials, Molecular Biology, Biological Markers, Neoplasms, Microbiology, Proteomics, Systems Biology, Devvelopmental Biology, Virology, Epigenesis; Genetic, Gene Regulatory Networks, Peptides, Toxicology)
Active research domain involvement	Number of biomedical and clinical research areas with active OpenScienceLink users	-	**22** (similar as above)
Open access	Number of indexed open access journal papers and datasets	-	**1,063** open access journals for which all of the articles are openly accessible, and 318 journals, for which some (the latest; e.g., the journals switched to open access recently) of the articles are openly accessible. Total of 1,381 OA journals.

Table 1: Mission Perspective KPIs for Overall Platform.

KPI	**Measure**		
		Expected progress Year 1	Actual progress Year 1
Funded projects beyond OpenScienceLink	Number of projects in which the OpenScienceLink services, models and tools are used and further developed.	-	**2** (BioASQ, HYBRIS)
Involved Stakeholders in the partnership	Number of stakeholders involved in the partnership	-	**2** (SLUB, SpringerOpen)

Stakeholders with commercial interest	Number of stakeholders having formally expressed commercial interest	**-**	**1** (SpringerOpen)
Journal publications	Number of OpenScienceLink-related scientific journal papers published by consortium members	**>=1**	**2**
Blog and website publications	Number of posts on blogs and websites about OpenScienceLink	**>=1**	**7**
Conference publications and presentations	Number of OpenScienceLink-related papers, presentations and presence at conferences, workshops and exhibitions	**>=3**	**4**
Joint workshops with other projects or related national initiatives	Number of workshops held with other projects or related initiatives	**-**	**0**
OpenScienceLink website visitors	Number of unique visitors to the OpenScienceLink website	**-**	**3,762**
Links to OpenScienceLink website	Number of external websites referring to OpenScienceLink website	**>=10**	**11**
OpenScienceLink press releases	Number of OpenScienceLink-related press releases published by consortium members	**>=2**	**2**
Project dissemination outside Europe	Number of OpenScienceLink-related events to which consortium members participated outside Europe	**-**	**1**
Project marketing	Number of OpenScienceLink-related marketing materials material (e.g., leaflets, banners, posters) produced and distributed by consortium members	**>=100**	**150**
Targeted contacts and approached potential customers	Number of stakeholders and potential customers (publishers, research organizations, universities) contacted by consortium members	**-**	**3**

Reached policy and decision makers	Number of policy and decision makers contacted by consortium members	**>=1**	**1**

Table 2: Resource Perspective KPIs for the Overall Platform.

KPI	**Measure**		
		Expected progress Year 1	Actual progress Year 1
Increase in data paper creation	Increase in number of data papers created per researcher	**-**	**0 (OSL platform in alpha release during Year 1)**
Creation of Best Practices (BPs) and Blueprints	Number of distinct Best Practices (BPs) and Blueprints Produced	**-**	**0 (OSL platform in alpha release during Year 1)**

Table 3: Internal Business Processes KPIs for the Overall Platform.

KPI	**Measure**		
		Expected progress Year 1	Actual progress Year 1
Involvement of young researchers in the project	Number of PhD students and Postdocs participating in the project	**>=10**	**15**
Career advancement of the OSL team	Number of received PhD degrees and relevant habilitations	**-**	**1**

Table 4: Learning and Growth Perspective KPIs for the Overall Platform.

2.3 OpenScienceLink Pilots Evaluation

The evaluation of the OpenScienceLink pilots, the degree of fulfilment of the respective requirements and the overall impact are very important, in addition to the consideration of the degree of satisfaction of the engaged stakeholders and interested parties. Besides that, the methodology that has been used to accomplish the pilots' results has to be evaluated by comparing it to existing state of the art methodologies when applicable.

The following comments have been collected after interviews with stakeholders:

1. In the registration page, it is important to have a link to "**privacy policy and conditions of use"** describing how the personal information entered by the user will be handled by the platform. The user after reading these terms should provide consent as this will be the basis for the OSL platform to process the users' personal information

2. The "research topics" as it appears in the alpha-version of the platform provides limited information in relation to the scope of platform. First, the provided options of "research topics" do not cover important scientific areas (e.g. endocrinology). Second, for the purpose of creating an efficient system for selection of reviewers, more specific information is needed. For example, the option "Cardiovascular diseases" is very general. Thus, it is important to collect the specific areas of expertise for each user. An approach could be to let the user define the areas of expertise by manual input and then try to match the input with mesh terms.

3. For the functions of the OSL platform, it could be very useful to have a more detailed personal profile of the user while taking into account that the more personal information is collected, the more detailed the ground for processing this data should be This additional information could be completed optionally by the user after the registration. This additional information may include:
    - Name of user as it appears in publications
    - Summary of CV (in a standardized format such as the European format)
    - a sector dedicated to the main research field
    - Funding during the last 5 years (helps detect conflicts of interest)
    - Website
    - Author ID in scopus (it could help retrieve all the published work of the user and citations)

2.3.1 Pilot 1: Open-access Data Journals Development

The following comments have been collected after interviews with stakeholders:

1. The success of development of new open-access datasets journals greatly depends on the vast use and reuse of the datasets from the scientific community. To this end, an important functionality of the platform should be the creation of well-structured and semantically linked datasets. For this reason, a more mature version of the platform should be able to retrieve the metadata of submitted datasets. The core characteristics of a dataset, that should be described in metadata (besides the scientific fields and research tags) , are:

- the **methodology used** to collect data (e.g. echocardiographic evaluation, Cardiac magnetic resonance, Exercise testing, Blood measurements etc) and the **variables measured in each case** (e.g. for echocardiographic evaluation, Variable 1: Left ventricular internal diameter at diastole (LVIDd), Variable 2: Left ventricular internal diameter at systole (LVIDs), Variable 3: Ejection fraction (EF%) etc).
- **Subjects** used to collect this dataset (humans, animals, cells, species etc.)
- **Age** of subjects used

- **Gender** of subjects used
- **Previous regular publications stemming from this dataset**

The selection should start from general to specific information. First of all, experimental or clinical data. Then considering experimental data, define the experimental model, in or ex vivo ect. Regarding clinical data, one should consider, at the beginning, the disease, e.g. heart failure, acute myocardial infarction, hypothyroidism etc, and then the characteristics of subjects enrolled, the type of methodologies etc.

2. As the number of open-access datasets will increase, there will be a growing need for a search engine for existing datasets in the platform. A datasets search engine should be able to provide an easy and efficient way to find specific datasets based on keywords. This search engine will greatly promote the reuse and boost the impact on society.

3. Since the Open-Access Data journal offers a complex type of data (i.e. research data rather thanpublications), particular attention should be paid to the copyright and licensing policy of the Journal. Research data is generally not copyright protected, how will the Journal deal with this issue?

4. What software should be used to create a dataset? Define how will the user (editor, reviewer etc) be able to open the specified file of the dataset in different formats
5. Original publications stemming from this dataset should be provided. I think that is important for end users willing to use the dataset in order to avoid repeating already published analyses (ie double publications).
6. Should funding agency that has funded the data collection be acknowledged when writing papers from the dataset. These policies should be stated clearly in the BMDJ.
7. Conflict of interest should be automatically generated.
8. Authors receiving most citations, downloads etc should be acknowledge by sending an email for the Editorial office and in the website,

KPI	Measure	Expected progress Year 1	Actual progress Year 1
Usage of the data articles	Number of views per month	-	-
	Number of downloads per month	-	-
	Citations	-	-
Usage of related datasets	Number of downloads per month	-	-
Usage by the media	Number of articles in popular media, including specialized blogs	-	-
Contributions	Submitted articles per quarter	-	-
Pool of reviewers	Number of researchers that have expressed an interest/ consent	-	-
Interested funders	Number of Research Sponsors and/ or Funding Authorities registered at the OSL platform	-	**2**
Geographic coverage	Number of countries represented on Editorial Board, authors or reviewers	**5**	**10**
Domain coverage	Number of biomedical and clinical research areas addressed by published data articles	-	-
Coverage by aggregators	Inclusion in indexing (including ISI[1]) and aggregator services	-	-
Library usage	Inclusion in library catalogues	-	-

Table 5: Mission Perspective KPIs for Pilot 1.

[1]Thus providing for getting an impact factor in the future.

KPI	Measure		
		Expected progress Year 1	Actual progress Year 1
Revenues from subscription for the hard copy	Number of paid subscriptions	-	-
Sponsorship	Number of funding agencies either directly sponsoring the journal or agreeing to sponsor the publication of individual contributions	-	-
Advertising	Value of advertisements in the journal or on the publisher's website in Euro	-	-

Table 6: Resource Perspective KPIs for Pilot 1.

KPI	Measure		
		Expected progress Year 1	Actual progress Year 1
Speed of the publication process (including peer review)	Average time from submission of a paper to its online publication, if accepted, in calendar day	-	-

Table 7: Internal Business Processes KPIs for Pilot 1.

KPI	Measure		
		Expected progress Year 1	Actual progress Year 1
Coverage within the biomedical field	Special issues and calls for papers for such issues, covering fields represented on the Editorial Board	-	**4**
Adaptation to the changing research landscape	Number of identified new trends and addition of respective members to the Editorial Board	-	-
Expanding the application of the open access data journal paradigm	Number of concepts for new open access data journals developed	-	-

Table 8: Learning and Growth Perspective KPIs for Pilot 1.

2.3.2 Pilot 2: A novel open, semantically-assisted peer review process

The following comments have been collected after interviews with stakeholders:

1. In the functionality of "submission of datasets", It would be useful if the submitting author could characterize the dataset as ***experimental or clinical***
2. In the process of submitting a paper to the Biomedical Data Journal (BMDJ) via the OpenScienceLink platform, the submitting author will be asked to provide keywords. The author would be free to select any keyword; however, it is strongly recommend to select keywords out of the NLM Medical Subject Headings, or MESH, with the same ontology being implemented in and supported by the OpenScienceLink platform. Selecting adequate keywords will facilitate the identification of most qualified reviewers, will speed up the review process and, more generally, will enhance the visibility and impact of the publication.
3. It is important during the review process that the platform incorporates reviewing templates and allows the user to complete this template and submit the revision.
4. An important novelty would be if the assigned reviewers could discuss and express opinions on the reviews and the review results. For this reason, it could be created a social network. Inside this network, a reviewer will be able to see the comments of the other reviewers and vote in favor or not. We could consider the possibility to open a discussion but this could be time-consuming and may lengthen the review process
5. In order to be able to support the review process,the platform should be able to automatically generate and send emails to selected reviewers and then notify the editor whether they accepted the invitation or not.

6. The privacy policy and conditions of use should fully explain the users and reviewers what will happen with their personal data, i.e. email addresses are also considered personal data. This is especially the case if the peer review process would develop into a sort of 'social network'.
7. Reviewers should automatically receive potentially important information: publications stemming from the dataset, authors academic experience (number of publication, most important publications, citation indexes based on ISI WOS, Google scholar ec.), funding of the study, COI.
8. Review form should be automated and include different criteria according to the journal. Comments can be graded as major and minor.
9. The submitted dataset could be graded in the context of research trends

KPI	**Measure**		
		Expected progress Year 1	Actual progress Year 1
Review request load	Number of review requests sent	-	-
Reviewer acceptance	Number of accepted review requests	-	-
Submitted reviews load	Number of submitted reviews	-	-
Success of reviewer recommendations	Number of review invitations based on platform suggestions	-	-
Usage by external venues	Number of venues for which reviews were requested	-	-
Number of Authorships	Number of authors whose publications were put up for review (cumulative)	-	-

Table 9: Mission Perspective KPIs for Pilot 2.

KPI	Measure		
		Expected progress Year 1	Actual progress Year 1
Speed of the review process	Control group	0	-

Table 10: Resource Perspective KPIs for Pilot 2.

KPI	Measure		
		Expected progress Year 1	Actual progress Year 1
Attraction of more competent reviewers	Questionnaire responses	0	-
Increased number of reviewers per review	Control group	0	-

Table 11: Internal Business Processes KPIs for Pilot 2.

KPI	Measure		
		Expected progress Year 1	Actual progress Year 1
Profile growth	Number of new platform profiles created by invited reviewers	-	-

Table 12: Learning and Growth Perspective KPIs for Pilot 2.

2.3.3 Pilot 3: Services for detection and analysis of research trends

The following comments have been collected after interviews with stakeholders:

1. It would be very useful if the platform could analyze and compare trends of different subfields within a certain field. For example, within the field of endocrinology, which subfields show the highest research interest.
2. The graph representing trends of research interest could be expanded to draw comparative lines between different fields. Thus the user could have a clear view of comparison of research trends between different fields or subfields.
3. Important information about research interest could be collected from social media and blogs and not only from analysis of the number of publications. For example, a temporal analysis of the number of times that a field or subfield is mentioned in social media and blogs could be an interesting index.
4. Important information about research trends could be also collected from data about ongoing clinical trials (e.g. from clinicaltrials.gov). A temporal analysis of the number of ongoing clinical trials per field or per drug could be an interesting index.
5. It would add useful information to the user if the platform could detect research trends for a certain field within a geographical area (e.g. Europe) and compare with other geographical areas (e.g. USA) for a certain time period (e.g. during last decade).

KPI	**Measure**		
		Expected progress Year 1	Actual progress Year 1
Trend searches	Number of executed trend searches	-	-

Table 13: Mission Perspective KPIs for Pilot 3.

KPI	**Measure**		
		Expected progress Year 1	Actual progress Year 1
Acceleration of trend identification	Questionnaire (percentage of users that identified trends faster)	-	-

Table 14: Resource Perspective KPIs for Pilot 3.

KPI	Measure		
		Expected progress Year 1	Actual progress Year 1
Trend detection F-Measure	F-Measure of hot topics predicted correctly by the platform for the following year	-	-

Table 15: Internal Business Processes KPIs for Pilot 3.

KPI	Measure		
		Expected progress Year 1	Actual progress Year 1
Expansion of Biomedical Data Journal through Trend Detection	Number of special issues for Biomedical Data Journal based on detected "hot topics"	-	-

Table 16: Learning and Growth Perspective KPIs for Pilot 3.

2.3.4 Pilot 4: Services for dynamic researchers' collaboration

The following comments have been collected after interviews with stakeholders:

1. The current version of the platform nicely provides the existing collaborations. This has to be expanded at some point with a functionality that will suggest potential collaborations. Detection of potential collaborations could be based on scientific expertise and scientific interests of different research groups as well as complementary methodological expertise.
2. Collaborations should only be suggested with researchers that also registered with the OSL platform and thus gave their consent for this. In terms of privacy, it would be good if researchers could opt-out from this service (i.e. with the registration, they have to explicitly click a button expressing their interest to be connected with other researchers for collaborations. If they do not click this button, their names will not show up in the list of suggested collaborators).

KPI	Measure		
		Expected progress Year 1	Actual progress Year 1
User Attraction	Number of Researchers /Scholars having used the pilot services at least once	**>=200**	**42** (alpha version, test purposes)
User Engagement	Number of Researchers /Scholars having used the pilot services more than once	**>=100**	**42** (alpha version, test purposes)

Table 17: Mission Perspective KPIs for Pilot 4.

KPI	Measure		
		Expected progress Year 1	Actual progress Year 1
Number of funded projects *(beyond OpenScienceLink)*	Number of projects in which the pilot models, services and tools are used and further developed	**-**	2 (BioASQ, HYBRIS)
Number of Interested Stakeholders	Number of Stakeholders to whom the pilot has been presented and who have expressed interest	**-**	**1**
Pilot Visibility: Publications	Number of pilot-related scientific papers published at journals, conferences and workshops	**-**	**2**
Pilot Visibility: Web Presence	Number of posts at blogs and web sites about the pilot	**>=1**	**7**

Table 18: Resource Perspective KPIs for Pilot 4.

KPI	Measure		
		Expected progress Year 1	Actual progress Year 1
Correctness of implicitly identified relationships among researchers	Percentage of recommendations which are relevant to the expert's topic/domain and are not part of his existing collaborations	**>=50%**	**-**
Correctness of implicitly identified relationships between researchers and research groups	Percentage of recommendations which are relevant to the expert's topic/domain and are not part of his existing collaborations	**>=50%**	**-**

Table 19: Internal Business Processes KPIs for Pilot 4.

KPI	Measure		
		Expected progress Year 1	Actual progress Year 1
Coverage within the biomedical field	Number of distinctive biomedical and clinical research areas (such as cardiology, pharmacology, etc) in which researchers may be able to find collaborations	**>=10**	**22** (Genomics, Genetics, Computational Biology, Health Care, Metabolic Networks and Pathways, Allergy and Immunology, Cardiovascular Diseases, Sequence Analysis, Neurobiology, Clinical Trials, Molecular Biology, Biological Markers, Neoplasms, Microbiology, Proteomics, Systems Biology, Devvelopmental Biology, Virology, Epigenesis; Genetic, Gene Regulatory Networks, Peptides, Toxicology)

Table 20: Learning and Growth Perspective KPIs for Pilot 4.

2.3.5 Pilot 5: Research evaluation services

The following comments have been collected after interviews with stakeholders:

1. It has to be taken into consideration the scenario of evaluating a specific publication. In this regard, the user has to be able to enter a title of the publication or journal-issue-volume-year and get some metrics.
2. For evaluation of a publication, it would be useful to have total citations, citations per year as well as a number of other simple metrics like page views, downloads of pdfs, appearance of article in social networks and blogs.
3. Concerning the ***evaluation of a journal***, the following metrics could be considered
   - the total citations received by a journal each year,
   - total number of documents published by journal each year,
   - Percentage of documents published in the year that have never been cited to date,
   - the impact factor
   - SNIP (Source normalized impact per paper)

4. Concerning the ***evaluation of a researcher or a department***, it would be useful to include the following known metrics
   - Number of publications
   - Publications per scientific field
   - A graph of publications per year
   - Total Citations
   - Citations per publication
   - H-index

5. Generally, the evaluation functionality refers to evaluation of different subjects. The subject of evaluation could be a researcher, a department, an institution, a journal or a specific publication. Different metrics could apply according to the subject of evaluation. Thus, it may be important to distinguish the processes of evaluation according to what is evaluated.

KPI	**Measure**		
		Expected progress Year 1	Actual progress Year 1
Stakeholders' Interest	Number of stakeholders (e.g., publishers) indicating interest in the developed evaluation metrics	**-**	**2**
Metrics Use	Number of entities which have introduced at least one of the evaluation metrics to their evaluation process	**-**	**-**

Table 21: Mission Perspective KPIs for Pilot 5.

KPI	Measure		
		Expected progress Year 1	Actual progress Year 1
Expressed Interest of Stakeholders	Number of Stakeholders (e.g., publishers) to whom the pilot has been presented and who have expressed interest (through discussions, letter of support, etc)	**-**	**2**
Pilot Visibility: Publications	Number of pilot-related scientific papers published at journals, conferences and workshops	**-**	**1 journal paper under preparation**
Pilot Visibility: Web Presence	Number of posts at blogs and web sites about the pilot	**>=1**	**7**

Table 22: Resource Perspective KPIs for Pilot 5.

KPI	Measure		
		Expected progress Year 1	Actual progress Year 1
Acceptability of research evaluation metrics	Percentage of experts indicating that the developed metrics are of value for the research community (Questionnaires)	**-**	**100% of the medical experts participating in the consortium**
Improvement of research evaluation metrics: experts opinion	Percentage by which the research evaluation metrics are considered improvement of existing ones, such as g-index, impact factor, etc (Questionnaires)	**-**	**-**
Improvement of research evaluation metrics: comparison	Percentage of past research papers for which existing evaluation metrics required at least 1 year more than the proposed metrics to indicate their importance in the field	**-**	**-**

Table 23: Internal Business Processes KPIs for Pilot 5.

3 Technical Evaluation

In this section, the technical evaluation of the deployed OpenScienceLink platform is conducted. The technical testing of the platform has been conducted according to the ISO Testing Standard ISO 9646. In the following sections, the three classes of tests are defined, and the actual tests with the respective results are presented.

3.1 Technical Evaluation: The Test Cases

The ISO 9646 defines three classes of tests as shown in the following table.

Tests Classes	Description
Basic Tests (BT)	A small number of tests (1 or 2) that are run to actually demonstrate that the platform has been correctly set-up. *It is infeasible to perform other tests if the Basic Tests fail.*
Capability Tests (CT)	A moderate number of tests, the purpose of which is to demonstrate the ability of the platform under test to perform basic sets of functions.
Behaviour Resolution Tests (BER)	A large number of tests that aim to verify that the platform under test behaves correctly under a wide range of situations, determined by various factors.

Table 24: Classes of Tests based on the ISO 9646.

The classification methodology of ISO 9646 is useful, especially towards choosing a fair number of tests of each one of the above classes.

All tests fall in two sub-categories:

Tests Behaviour Types	Description
Successful/Valid Tests (V)	As the name suggests, these tests verify the correct behaviour of the system under test under specific conditions.
Unsuccessful/Invalid Tests (I)	These tests verify that the system under test acts "as it should" under circumstances such as unexpected events, parameters out of range, invalid or unsupported options, negotiation failures and invalid combinations of parameters.

Table 25: Tests Behavior Types.

In this section we will present the tests cases that were applied at the OpenScienceLink platform. Initially we will define some broader categories for the tests cases. Also we will present the structure of each test case defining what we should monitor about each one.

3.1.1 Tests Subclasses

In the following table there are some subclasses of the "main" test classes seen in the previous section. In the first column there is the test class in which each subclass belongs to, while in the last column we can see the types of test (Behaviour Type) that will be performed. These subclasses depict the functionality that will be tested. For each one a few tests will be performed. These tests will be analyzed in the following sections.

Tests Class Name	ID	Tests Subclass Name	ID	Behaviour Type
Basic Tests	BT			
		OpenScienceLink Platform Setup	OPS	V
		Connections check	CC	V
Capability Tests	CT			
		Secure End user Connection	SEC	V
Behavior Resolution Tests	BER			
		CF:Login	CF-L	V-I
		CF:Registration	CF-R	V-I
		CF:Searching	CF-S	V-I
		Pilot 1:Upload Data Set	P1-UDS	V-I
		Pilot 1:Create New Journal Issue	P1-NJI	V-I
		Pilot 2:Create Review Call	P2-CRC	V-I
		Pilot 2:Upload File(s) For Review	P2-UFR	V-I
		Pilot 2:Get Reviewer Suggestion	P2-GRS	V-I
		Pilot 2:Select and Invite Reviewers	P2-SIR	V-I
		Pilot 2:Managing the Review Process	P2-MRP	V-I
		Pilot 2:Review Submission	P2-RS	V-I
		Pilot 3: Request for Trend Analysis based on Topic	P3-RTA	V-I

	Pilot 4:Request for Coauthorship Graphs	P4-RFC	V-I
	Pilot 5: Request for Publication Volume based on Topic	P5-RPT	V-I

Table 26: Subcategories and Behavior Tests.

Notice: In the above table we should notice that we have specified only Successful/Valid Tests (V) for the subclasses of the Basic Tests and the Capability Tests.

3.1.2 Test Case Identifiers

The identifier of each test case will have the following format:

```
<System_ID>_<Tests_Class_ID>_<Subclass_ID>_<Behaviour_Type_ID>_<nn>
```

In the following table there is a short description about each field of the identifier.

Field	Description
System ID	OpenScienceLink
Tests Class ID	Basic Tests (BT) or Capability Tests (CT) or Behavior Resolution Tests (BER)
Subclass ID	**Any class from the subclasses specified in** Table 26
Behaviour Type ID	Successful/Valid (V) or Unsuccessful/Invalid (I)
Nn	Sequential Number (01 to 99)

Table 27: The Subfields of the Test Case Identifier.

The identifier described is unique and can provide us with information about the tests class, the subclass and the type in which each test case belongs to.

3.1.3 Test Case Structure

Each test case should contain all the fields mentioned in the table below:

Field	Description
ID	A unique identifier for the test case.
Title	The title of the test case.
Description	A brief description of the test case.
Setup	The prerequisites in order to have access in this test case.
Testing Procedure	The testing procedure that will be used in this test case. Here we should answer in the question: “How we will examine that the system provides the functionality described”.
Expected Result	Describe the expected result of the testing procedure.
Result	(Success/Failure)

Table 28: Test Case Structure.

3.2 Basic Tests (BT)

Two basic tests have been specified. Their purpose is to ensure that the platform is up and running and a connection can be established between the application components of the platform.

3.2.1 Valid OpenScienceLink Platform Setup

Test Case ID	OpenScienceLink_BT_OPS_V_01
Test Case Title	Valid OpenScienceLink Platform Setup
Test Case Description	Ensure that all OpenScienceLink components and services are up and running.
Setup	The hardware, software and applications must be identified for every pilot. Administrators must be able to start servers and run their applications.
Testing Procedure	The administrators start their application servers and ensure that all necessary components (hardware and servers) are up and running to start their applications.
Expected Result	All Servers Application components are shown as running.
Test Result	(Success / Failure)

3.2.2 Successful Connection

Test Case ID	OpenScienceLink _BT_CC_V_01
Test Case Title	Successful Connection
Test Case Description	Verify the ability of browsers to establish a connection with all OpenScienceLink entities.
Setup	Internal testing of the connections to the services and resources is made once a request to the platform URL is made.
Testing Procedure	Users visit the OpenScienceLink platform URL, and the connection to the services URLs, databases and resources is teted.
Expected	All connections shown a etablished.

Result	
Test Result	(Success / Failure)

3.3 Capability Tests (CT)

One capability test has been specified. Their purpose is to ensure that a secure connection can be established between the end user and the OpenScienceLink platform and also between the application components and services.

3.3.1 Secure End User Connection

Test Case ID	OpenScienceLink _CT_SEC_V_01
Test Case Title	Successful Secure End user Connection
Test Case Description	Verify the secure connection of the browsers with the platform servers.
Setup	Browsers connecting to the platform are tested on whether they can establish a secure connection with the platform components.
Testing Procedure	User attempt to connect (visit) the platform URL and the connection is tested on the terms that it is secure and the content (messages) exchanged are encrypted.
Expected Result	A valid secure connection can be established between clients (browsers) and the platform servers.
Test Result	(Success / Failure)

3.4 Behavior Resolution Tests (BER)

A large number of Behaviour Resolution Tests have been specified in order to verify the correct behaviour of the platform. These tests are classified based on the subclasses seen in Table 26.

3.4.1 Common Functionalities

3.4.1.1 CF: Login

3.4.1.1.1 Successful Login

Test Case ID	OpenScienceLink _BER_CF-L_V_01
Test Case Title	Successful Login
Test Case Description	Verify the correct operation of the authentication mechanism and evaluate its usability
Setup	Access to the respective GUI is required
Testing Procedure	The user enters a valid user name and password on the login form (either Client Application or Web area) and presses the "Login" button
Expected Result	Upon successful login, the system shows the main window of the Client Application (for normal users), or the main page of the OpenScienceLink web area (for administrator testers).
Test Result	(Success / Failure)

3.4.1.1.2 Unsuccessful Login – Missing Data

Test Case Title	OpenScienceLink _BER_CF-L_I_02
Test Case Title	Unsuccessful Login – Missing Data
Test Case Description	Identify whether the attempted login corresponds to a registered user.
Setup	A user via a browser attempts to login to the platform. The user provides and e-mail that does not exist, is not registered, or no e-mail.
Testing	The user tries to login with e-mail address that is unknown to the platform, or

Procedure	with empty credentials.
Expected Result	Unsuccessful login with an error message informing the user.
Test Result	(Success / Failure)

3.4.1.1.3 Unsuccessful Login – Invalid Credentials

Test Case Title	**OpenScienceLink _BER_CF-L_I_03**
Test Case Title	Unsuccessful Login – Invalid Credentials
Test Case Description	Verify the correct operation of the authentication and authorization mechanism and evaluate its usability.
Setup	Access to the respective GUI is required.
Testing Procedure	The user enters an invalid user name and/or password on the login page and presses the “login” button.
Expected Result	The system returns an error message along with the fields to re-enter the credentials.
Test Result	(Success / Failure)

3.4.1.2 CF: Registration

3.4.1.2.1 Profile Creation

Test Case Title	**OpenScienceLink _BER_CF-R_V_01**
Test Case Title	Registration and Creation of New Profile
Test Case Description	The user registers first time at the platform, and creates a profile.
Setup	Creation of a new user account and of a user profile in the platform.
Testing Procedure	The user follows the instructions and respective links to create a new user account and profile within the OSL platform.
Expected	The user receives a confirmation e-mail that his account has been created,

Result	and he should be able to use the credentials to login again, and see his saved profile details.
Test Result	(Success / Failure)

3.4.1.2.2 Profile Editing and Saving

Test Case Title	OpenScienceLink _BER_CF-R_V_02
Test Case Title	Editing and Saving of an Existing User Profile
Test Case Description	Verify the correct operation of the editing and saving of an existing user profile.
Setup	Using an existing account, the ability to edit and save the changes to the existing account is tested.
Testing Procedure	The user logs in to the platform with his existing account credentials, browses to his profile tab, and alters the information. Once the change are saved, the new information should be part of his existing profile, including all changes made.
Expected Result	The saved changes in the profile are stored and visible in any future login attempt. The stored profile is now the new profile of the existing user.
Test Result	(Success / Failure)

3.4.1.3 CF: Searching

3.4.1.3.1 Successful Search for Datasets and Citations

Test Case Title	OpenScienceLink _BER_CF-S_V_01
Test Case Title	Searching for Datasets and Citations with a Valid Query
Test Case Description	Verify the correct operation of the searching of datasets and citations with a query that is expected to return a result set (non-empty set).
Setup	Using the search mechanism of the platform to retrieve relevant datasets and citations using a valid query.
Testing Procedure	The user browses to the search tab of the OSL platform and submits a valid query that is expected to fetch some dataset and/or citation results.

Expected Result	The results matching the query are fetched from the platform databases and indexes and are presented to the user.
Test Result	(Success / Failure)

3.4.1.3.2 Unsuccessful Search for Datasets and Citations

Test Case Title	**OpenScienceLink _BER_CF-S_I_02**
Test Case Title	Searching for Datasets and Citations with an Invalid Query
Test Case Description	Verify the correct operation of the searching of datasets and citations with a query that is expected to not return any results (empty set).
Setup	Using the search mechanism of the platform to retrieve relevant datasets and citations using an invalid query.
Testing Procedure	The user browses to the search tab of the OSL platform and submits an invalid query that is not expected to fetch any datasets or citation results.
Expected Result	The empty set is returned and the user is informed that there are no results for the given query.
Test Result	(Success / Failure)

3.4.2 Pilot 1

3.4.2.1 P1:Upload Data Set

3.4.2.1.1 Upload Data Set Successfully

Test Case ID	**OpenScienceLink _BER_P1-UDS_V_01**
Test Case Title	Upload Data Set Successfully
Test Case Description	Verify that a non-empty dataset that has not yet been submitted to the platform is successfully uploaded.
Setup	Access to the respective GUI; the user must be logged in as author.
Testing Procedure	The user enters the “Upload Dataset” page, fills in all the necessary fields, uploads a zip file with the dataset or provides an external URL and presses “Save Changes”.

Expected Result	Newly uploaded dataset is visible to the author.
Test Result	(Success / Failure)

3.4.2.1.2 Upload Data Set Failed – Data Set Already Exists

Test Case Title	**OpenScienceLink _BER_ P1-UDS _I_02**
Test Case Title	Upload Data Set Failed – Data Set Already Exists
Test Case Description	Verify that if a user tries to submit a dataset that has already been submitted, the submission process fails.
Setup	Access to the respective GUI; the user must be logged in as author.
Testing Procedure	The user enters the "Upload Dataset" page, fills in all the necessary fields, provided a zip file with the dataset or an external URL and presses "Save Changes". The dataset with such name/description or URL has already been uploaded.
Expected Result	The submission process is not performed; the user gets the message that the data set already exists.
Test Result	(Success / Failure)

3.4.2.1.3 Upload Data Set Failed – Missing data

Test Case ID	**OpenScienceLink_BER_ P1-UDS _I_03**
Test Case Title	Upload Data Set Failed – Missing Data
Test Case Description	Verify that if a user tries to submit a dataset without providing the actual data, the submission process fails.
Setup	Access to the respective GUI; the user must be logged in as author.
Testing Procedure	The user enters the "Upload Dataset" page, fills in all the necessary fields, but does not provide a zip file with the dataset or an external URL and presses "Save Changes".
Expected	The submission process is not performed; the user gets the message that the

Result	data is missing.
Test Result	(Success / Failure)

3.4.2.2 P1:Create New Journal Issue

3.4.2.2.1 New Journal Issue Created Successfully

Test Case ID	OpenScienceLink_BER_ P1-NJI _V_01
Test Case Title	New Journal Issue Created Successfully
Test Case Description	Verify that a new issue of the journal can be successfully created by an editor.
Setup	The user is logged in as editor.
Testing Procedure	The user goes to "Editor Activities" tab and presses "Add Issue". Then (s)he selects the volume, fills in the required fields and presses "Save changes".
Expected Result	A newly created issue should appear in the list of available issues in the "Editor Activities" tab.
Test Result	(Success / Failure)

3.4.2.2.2 New Journal Issue Creation Failed – Issue Already Exists

Test Case ID	OpenScienceLink_BER_ P1-NJI _I_02
Test Case Title	New Journal Issue Creation Failed – Issue Already Exists
Test Case Description	Verify that an issue of the journal with a specific title and deadlines cannot be created twice.
Setup	The user is logged in as editor.
Testing Procedure	The user goes to "Editor Activities" tab and presses "Add Issue". Then (s)he selects the volume, fills in the title and deadline fields with the values of already existing issue, and presses "Save changes".
Expected Result	The creation of a new issue is not completed, a user gets a message that such issue already exists.

Test Result	(Success / Failure)

3.4.2.2.3 Edit Existing Journal Issue

Test Case ID	**OpenScienceLink_BER_ P1-NJI _V_03**
Test Case Title	Operations on a journal issue are done successfully
Test Case Description	Verify that a user with author privileges can view, edit and delete and existing journal issue that he has created
Setup	The user is logged in as editor and is the creator of the journal issue.
Testing Procedure	The user goes to "Editor Activities" tab and presses "Add Issue" and performs the following operations on journal issues (by clicking on respective thumbnails): "delete the issue", "edit the issue", "view the issue", "view datasets submitted for this issue".
Expected Result	All four operations can be successfully performed.
Test Result	(Success / Failure)

3.4.3 Pilot 2

3.4.3.1 P2: Create Review Call

3.4.3.1.1 Call Creation Successful

Test Case ID	**OpenScienceLink _BER_P2-CRC_V_01**
Test Case Title	Call Creation Successful
Test Case Description	Verify the correct operation of the review call creation
Setup	The user must have logged in to the platform with editor privileges.
Testing Procedure	The user creates a review call by correctly filling the form that can be accessed from the „editor activities" tab of the platform.
Expected	Newly created review call is displayed and open for submissions.

Result	
Test Result	(Success / Failure)

3.4.3.1.2 Call Creation Failed – Missing Data

Test Case ID	OpenScienceLink _BER_P2-CRC_I_02
Test Case Title	Call Creation Failed – Missing Data
Test Case Description	Verify the correct response of the service when required information has not been provided.
Setup	The user must have logged in to the platform with editor privileges.
Testing Procedure	The user attempts to create a review call by filling the form that can be accessed from the „editor activities“ tab of the platform, but leaves out required information (e.g., the venue for the call).
Expected Result	Presentation of an error message to the user indicating that required data has not been provided.
Test Result	(Success / Failure)

3.4.3.2 P2: Upload Files for Review

3.4.3.2.1 File Upload Successful

Test Case ID	OpenScienceLink _BER_P2-UFR_V_01
Test Case Title	File Upload Successful
Test Case Description	Verify the correct operation of the file upload functionality.
Setup	The user must have logged in to the platform with editor privileges.
Testing Procedure	The user clicks the „upload“ button on the „editor activities“ tab of the platform, correctly fills the form and selects a file for upload.
Expected Result	The file is stored on the server and the review process can proceed with the next stage.

Test Result	(Success / Failure)

3.4.3.2.2 File Upload Failed – Missing Data

Test Case ID	OpenScienceLink _BER_P2-UFR_I_02
Test Case Title	File Upload Failed – Missing Data
Test Case Description	Verify the correct response of the service when required data has not been provided.
Setup	The user must have logged in to the platform with editor privileges.
Testing Procedure	The user clicks the „upload“ button on the „editor activities“ tab of the platform, leaves out required information while filling the form and selects a file for upload.
Expected Result	Presentation of an error message to the user indicating that required data has not been provided.
Test Result	(Success / Failure)

3.4.3.3 P2: Get Reviewer Suggestions

3.4.3.3.1 Get Reviewer Suggestions Successfully

Test Case ID	OpenScienceLink _BER_P2-GRS_V_01
Test Case Title	Get Reviewer Suggestions Successfully
Test Case Description	Verify that the system correctly retrieves reviewer suggestions when appropriate keywords are provided.
Setup	The user must have logged in to the platform with editor privileges.
Testing Procedure	The user adds one or more closely connected terms describing a research topic and requests reviewer suggestions.
Expected Result	The system presents a list of appropriate potential reviewers.

Test Result	(Success / Failure)

3.4.3.3.2 Get Reviewer Suggestions Failed – No Appropriate Reviewers

Test Case ID	OpenScienceLink _BER_ P2-GRS _I_02
Test Case Title	Get Reviewer Suggestions Failed – No Appropriate Reviewers
Test Case Description	Verify the correct response of the service when an inappropriate set of keywords is selected.
Setup	The user must have logged in to the platform with editor privileges.
Testing Procedure	The user adds a relatively large set of very diverse terms describing a research topic and requests reviewer suggestions.
Expected Result	The system presents an error message to the user indicating that no reviewer can be found for the entered set of terms. It recommends to the user to remove some terms with low importance.
Test Result	(Success / Failure)

3.4.3.4 P2: Select and Invite Reviewers

3.4.3.4.1 Select and Invite Suggested Reviewers

Test Case ID	OpenScienceLink _BER_ P2-SIR_V_01
Test Case Title	Select and Invite Suggested Reviewers
Test Case Description	Verify that the selection and invitation of suggested reviewers works as planned.
Setup	The user must have logged in to the platform with editor privileges, and a list of reviewer suggestions must have been retrieved successfully.
Testing Procedure	The user selects one or more reviewers from the list of suggestions and clicks „Invite reviewers“.
Expected	The system starts the process for inviting reviewers by presenting the

Result	invitation form for each reviewer who has been selected by the user.
Test Result	(Success / Failure)

3.4.3.4.2 Invite Reviewers Chosen by the User

Test Case ID	**OpenScienceLink _BER_ P2-SIR_I_02**
Test Case Title	Invite Reviewers Chosen by the User
Test Case Description	Verify that the user can invite reviewers not on the list of suggestions.
Setup	The user must have logged in to the platform with editor privileges, and a list of reviewer suggestions must have been retrieved (list may be empty).
Testing Procedure	The user adds one or more reviewers to the list of suggestions by entering their name and e-mail, selects them and clicks „Invite reviewers“.
Expected Result	The system starts the process for inviting reviewers presenting the invitation form for each reviewer who has been selected by the user in succession.
Test Result	(Success / Failure)

3.4.3.4.3 Complete the Invitation

Test Case ID	**OpenScienceLink _BER_ P2-SIR_V_03**
Test Case Title	Complete the Invitation
Test Case Description	Verify that the system sends e-mails to the selected reviewers after the user has filled all invitation forms.
Setup	The user must have logged in to the platform with editor privileges.
Testing Procedure	For testing purposes, the user adds him- or herself as a reviewer and completes the invitation process.
Expected	The system sends an e-mail invitation to the user containing the text that was entered while filling the invitation form as well as a link to the review form.

Result	The editor's overview table for the invited reviewers shows that the user has been invited as a reviewer.
Test Result	(Success / Failure)

3.4.3.5 P2: Managing the Review Process

3.4.3.5.1 Managing the Review Process: Request Accepted

Test Case ID	OpenScienceLink _BER_ P2-MRP_V_01
Test Case Title	Managing the Review Process: Request Accepted
Test Case Description	Verify that the system allows invited reviewers to accept the invitation and displays this information to the inviting editor.
Setup	**OpenScienceLink _BER_ P2-SIR_V_03** has been completed successfully.
Testing Procedure	The user opens the link sent by e-mail and accepts the review invitation.
Expected Result	The user's “Reviewer Activities” overview now contains a link to the review form. The editor's overview table for the invited reviewers shows that the user accepted the invitation.
Test Result	(Success / Failure)

3.4.3.5.2 Managing the Review Process: Request Denied

Test Case ID	OpenScienceLink _BER_ P2-MRP_V_02
Test Case Title	Managing the Review Process: Request Denied
Test Case Description	Verify that the system allows invited reviewers to reject the invitation and displays this information to the inviting editor.
Setup	**OpenScienceLink _BER_ P2-SIR_V_03** has been completed successfully.
Testing	The user opens the link sent by e-mail and rejects the review invitation.

Procedure	
Expected Result	The editor's overview table for the invited reviewers shows that the user rejected the invitation.
Test Result	(Success / Failure)

3.4.3.5.3 Managing the Review Process: Send E-Mail Reminder

Test Case ID	OpenScienceLink _BER_ P2-MPR_V_04
Test Case Title	Managing the Review Process: Send E-Mail Reminder
Test Case Description	Verify that the system allows editors to send reminders to invited reviewers.
Setup	**OpenScienceLink _BER_ P2-SIR_V_03** has been completed successfully.
Testing Procedure	The editor uses the platform's “send e-mail reminder” functionality.
Expected Result	The system sends an e-mail reminder to the user.
Test Result	(Success / Failure)

3.4.3.6 P2: Review Submission

3.4.3.6.1 Review Submission Successful

Test Case ID	OpenScienceLink _BER_ P2-RS_V_01
Test Case Title	Review Submission Successful
Test Case Description	Verify that the system allows invited reviewers to submit the correctly filled out review form and editors to access the review.
Setup	**OpenScienceLink _BER_ P2-MPR_V_01** has been completed successfully.
Testing Procedure	The user fills out all required fields of the review form and submits the review.
Expected Result	Presentation of a confirmation message to the user indicating that the review has been submitted successfully. The editor's overview table for the invited reviewers shows that the user submitted the review and now contains a link to the review.
Test Result	(Success / Failure)

3.4.3.6.2 Review Submission Failed – Required Input Missing

Test Case ID	OpenScienceLink _BER_ P2-RS_I_02
Test Case Title	Review Submission Failed – Required Input Missing
Test Case Description	Verify that the system gives the correct error message to invited reviewers if they attempt to submit the review form without filling all required fields.
Setup	**OpenScienceLink _BER_ P2-MPR_V_01** has been completed successfully.
Testing Procedure	The user attempts to submit the review without filling out all required fields.
Expected Result	Presentation of an error message to the user indicating that required data has not been provided.
Test Result	(Success / Failure)

3.4.4 Pilot 3

3.4.4.1 P3:Request for Trend Analysis based on Topic

3.4.4.1.1 Request for Visualizing the Trend of a Given Topic Successfully

Test Case ID	OpenScienceLink _BER_P3-RTA_V_01
Test Case Title	Request for Visualizing the Trend of a Given Topic Successfully
Test Case Description	Verify the correct operation of the request for topic trend analysis visualization
Test Case Purpose	To verify that the trend of existing topics are presented to the user through plots
Setup	The user needs to have logged in the platform.
Testing Procedure	The user enters one or more terms describing the research topic for which they would like to be presented with the trend analysis plots.
Expected Result	Presentation of the trend analysis plot for the research topic which the user has described through the query terms.
Test Result	(Success / Failure)

3.4.4.1.2 Request for Visualizing the Trend of a Given Topic - Missing or Incomplete Data

Test Case ID	OpenScienceLink_BER_P3-RTA_I_02
Test Case Title	Request for Visualizing the Trend of a Given Topic - Missing or Incomplete Data
Test Case	Verify the correct response of the service when no terms, or not supported

Description	terms describing a topic have been provided.
Test Case Purpose	To verify the correct response of the service when no terms or not supported terms describing a topic have been provided.
Setup	The user needs to have logged in the platform.
Testing Procedure	The user requests to be presented with the trend analysis plot without filling in any data, or filling terms that are not supported or indexed.
Expected Result	Presentation of an error message to the user indicating that no data, or unsupported data have been provided.
Test Result	(Success / Failure)

3.4.5 Pilot 4

3.4.5.1 P4:Request for Co-authorship Graphs

3.4.5.1.1 Request for Coauthorship Graphs Successfully

Test Case ID	**OpenScienceLink _BER_P4-RFC_V_01**
Test Case Title	Request for Coauthorship Graphs Successfully
Test Case Description	Verify the correct operation of the request for coauthorship graphs
Test Case Purpose	To verify that existing coauthorships are presented to the user through graphs.
Setup	The user needs to have logged in the platform.
Testing Procedure	The user enters one or more terms describing the research topic or the name of the scientist for whom they would like to be presented with the coauthorship graphs.
Expected Result	Presentation of the coauthorship graphs for the research topic which the user has described through the terms or for the scientist whose name they have entered.
Test Result	(Success / Failure)

3.4.5.1.2 Request for Coauthorship Graphs Failed – Missing data

Test Case ID	**OpenScienceLink_BER_P4-RFC_I_02**
Test Case Title	Request for Coauthorship Graphs Failed – Missing data
Test Case Description	Verify the correct response of the service when no terms describing a topic or no scientist name have been provided.
Test Case Purpose	To verify the correct response of the service when no terms describing a topic or no scientist name have been provided.
Setup	The user needs to have logged in the platform.
Testing Procedure	The user requests to be presented with the coauthorship graphs without filling in any data.
Expected	Presentation of an error message to the user indicating that no data has been

Result	provided.
Test Result	(Success / Failure)

3.4.5.1.3 Request for Coauthorship Graphs Failed – Inappropriate data

Test Case ID	**OpenScienceLink_BER_P4-RFC_I_03**
Test Case Title	Request for Coauthorship Graphs Failed – Inappropriate data
Test Case Description	Verify the correct response of the service when inappropriate data have been provided.
Test Case Purpose	To verify the correct response of the service when inappropriate data have been provided.
Setup	The user needs to have logged in the platform.
Testing Procedure	The user requests to be presented with the coauthorship graphs after filling in inappropriate data (i.e., terms which do not describe a biomedical topic or comprise the name of a scientist).
Expected Result	Presentation of an error message to the user indicating that inappropriate data has been provided.
Test Result	(Success / Failure)

3.4.6 Pilot 5

3.4.6.1 P5: Request for Publication Volume based on Topic

3.4.6.1.1 Request for Publication Volume based on Topic Successfully

Test Case ID	**OpenScienceLink _BER_P5-RPT_V_01**
Test Case Title	Request for Publication Volume based on Topic Successfully
Test Case Description	Verify the correct operation of the request for publication volume based on Topic
Test Case Purpose	To verify the correct operation of the request for publication volume based on Topic
Setup	The user needs to have logged in the platform.
Testing Procedure	The user enters one or more terms describing the research topic for which they would like to receive evaluation.
Expected Result	Presentation of a series of ranked lists of Country, City, Journals, Authors based on the number of publications for the specific topic.
Test Result	(Success / Failure)

3.4.6.1.2 Request for Publication Volume based on Topic Failed – Missing data

Test Case ID	**OpenScienceLink_BER_P5-RPT_I_02**
Test Case	Request for Publication Volume based on Topic Failed – Missing data

Title	
Test Case Description	Verify the correct response of the service when no terms describing a topic have been provided.
Test Case Purpose	To verify the correct response of the service when no terms describing a topic have been provided.
Setup	The user needs to have logged in the platform.
Testing Procedure	The user requests to be presented with the ranked lists of Country, City, Journals, Authors based on the number of publications without entering any terms describing a topic.
Expected Result	Presentation of an error message to the user indicating that no data has been provided.
Test Result	(Success / Failure)

3.4.6.1.3 Request for Publication Volume based on Topic Failed – Inappropriate data

Test Case ID	**OpenScienceLink_BER_P5-RPT_I_03**
Test Case Title	Request for Publication Volume based on Topic Failed – Inappropriate data
Test Case Description	Verify the correct response of the service when inappropriate data have been provided.
Test Case Purpose	To verify the correct response of the service when inappropriate data have been provided.
Setup	The user needs to have logged in the platform.
Testing Procedure	The user requests to be presented with the ranked lists of Country, City, Journals, Authors based on the number of publications and has entered inappropriate terms which do not describe a biomedical topic.
Expected Result	Presentation of an error message to the user indicating that inappropriate data has been provided.
Test Result	(Success / Failure)

3.5 Technical Evaluation Results

The following table summarizes the technical evaluation results. As the table shows, all of the contacted tests were successful, but, in 5 cases, the error messages should be added or edited (5 I tests), Overall, this evaluation and testing shows that the first release of the platform is working in a technically satisfactory manner.

Test Case Title	Result
OpenScienceLink_BT_OPS_V_01	Success
OpenScienceLink _BT_CC_V_01	Success
OpenScienceLink _CT_SEC_V_01	Success
OpenScienceLink _BER_CF-L_V_01	Success
OpenScienceLink _BER_CF-L_I_02	Success
OpenScienceLink _BER_CF-L_I_03	Success
OpenScienceLink _BER_CF-R_V_01	Success
OpenScienceLink _BER_CF-R_V_02	Success
OpenScienceLink _BER_CF-S_V_01	Success
OpenScienceLink _BER_CF-S_I_02	Success
OpenScienceLink _BER_P1-UDS_V_01	Success
OpenScienceLink _BER_ P1-UDS _I_02	Success
OpenScienceLink_BER_ P1-UDS _I_03	Success
OpenScienceLink_BER_ P1-NJI _V_01	Success
OpenScienceLink_BER_ P1-NJI _I_02	Success
OpenScienceLink_BER_ P1-NJI _V_03	Success
OpenScienceLink _BER_P2-CRC_V_01	Success
OpenScienceLink _BER_P2-CRC_I_02	Success
OpenScienceLink _BER_P2-UFR_V_01	Success
OpenScienceLink _BER_P2-UFR_I_02	Success
OpenScienceLink _BER_P2-GRS_V_01	Success
OpenScienceLink _BER_ P2-GRS _I_02	Success
OpenScienceLink _BER_ P2-SIR_V_01	Success
OpenScienceLink _BER_ P2-SIR_I_02	Success
OpenScienceLink _BER_ P2-SIR_V_03	Success
OpenScienceLink _BER_ P2-MRP_V_01	Success
OpenScienceLink _BER_ P2-MRP_V_02	Success
OpenScienceLink _BER_ P2-MPR_V_04	Success
OpenScienceLink _BER_ P2-RS_V_01	Success

OpenScienceLink _BER_ P2-RS_I_02	Success
OOpenScienceLink _BER_P3-RTA_V_01	Success
OpenScienceLink_BER_P3-RTA_I_02	Success (although no message is prompted)
OpenScienceLink _BER_P4-RFC_V_01	Success
OpenScienceLink _BER_P4-RFC_I_02	Success (although no message is prompted)
OpenScienceLink _BER_P4-RFC_I_03	Success (although no message is prompted)
OpenScienceLink _BER_P5-RPT_V_01	Success
OpenScienceLink _BER_P5-RPT_I_02	Success (although no message is prompted)
OpenScienceLink _BER_P5-RPT_I_03	Success (although no message is prompted)

Table 29: Summary of Technical Evaluation Results.

4 Financial Evaluation

4.1 Overall OSL Platform Financial Evaluation

4.1.1 The overall open access landscape

A growth trend has been observed for the open access (OA) publication market over the past years. According to (Laakso, Welling, Bukvova, Nyman, & Björk, 2011) open access publications production has increased more than 10 times within the past decade both in terms of articles and journals. In fact, their study indicates that OA is already in its consolidation period. Numbers are quite indicative. The directory of open access journals (DOAJ) already includes more than 9800 journals and 1.5 million articles published from over 120 countries. OpenDOAR (Directory of Open Access Repositories) has more than 2500 repositories listed, ROAR (Registry of Open Access Repositories) presents information about more than 2,500 repositories, while the ROARMAP (Registry of Open Access Repositories Mandatory Archiving Policies) includes more than 440 open access mandate policies. The Directory of Open Access Books (DOAB) includes more than 1,645 Academic peer-reviewed books from 55 publishers. Moreover, the BASE (Bielefeld Academic Search Engine) search engine, which focuses on academic open access web resources has already indexed more than 56 million documents and 2700 sources. HighWire Press by Stanford University comprises an archive of over 2.3 million free full-text provided articles. In the biomedical domain, in particular, PMC (PubMed Central) has already indexed more than 734,000 OA articles with more than 1,200 journals providing their content with immediate free access and over 970 journals offering all of their articles openly accessible.

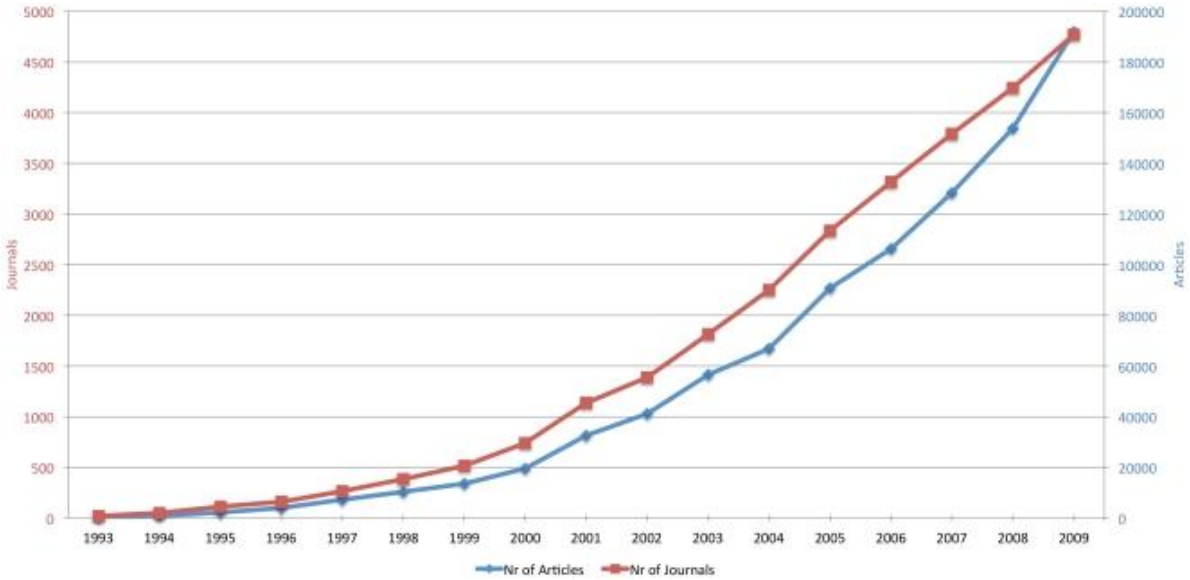

Figure 6: Open access publishing between 1993 and 2009.

A study in (Laakso & Björk, 2012) shows that although initially open access publishing has been flourishing in the world of universities and scientific societies, commercial publishers have become key actors on the OA scene, with an almost tenfold increase in the number of OA articles being published within a 6 years period (2005-2011).

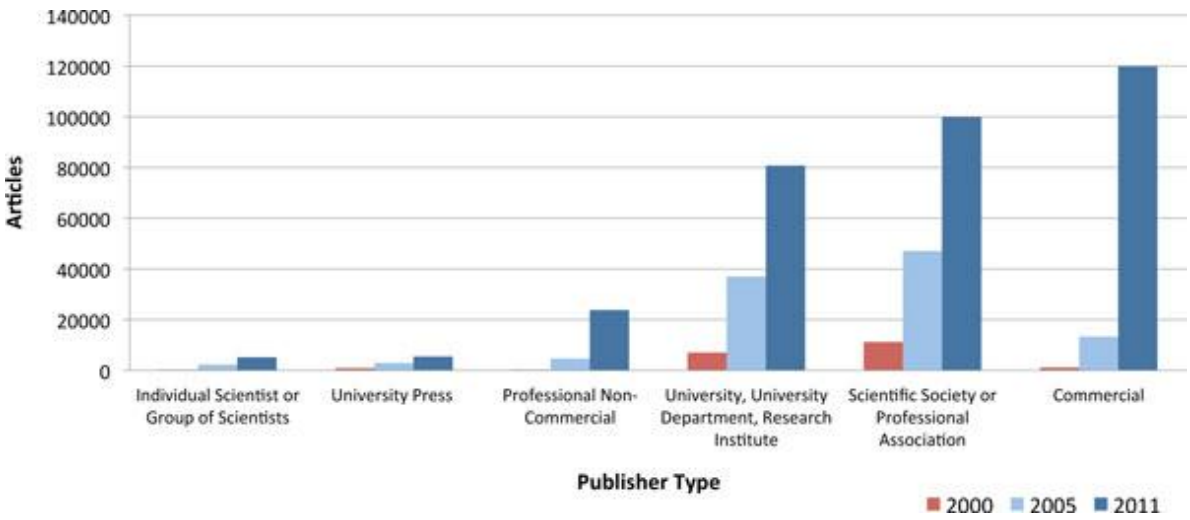

Figure 7: Different Publisher Types for Open Access Articles.

Given that profit comprises a fundamental concept in the commercial world and publication of research includes a series of costs, reconciliation of publishing fees for OA journals has been attempted through research and subscription funding. From this perspective, there are two main models for OA provision; green and gold OA (Harnad, et al., 2004). In Green OA, scientists publish their findings through institutional or central repositories, or self-archiving (i.e., by placing their peer-reviewed post-prints on OA web pages). In fact, research institutions and funders, including the European Commission and Harvard, mandate their scientists to make their research findings publicly available in order to maximise the impact of the scientific work conducted. In Gold OA, publishing is done through OA journals, such as BioMed Central and PLoS, which may either allow publications for free or set a publishing fee to authors or their funders. Gradually more thorough classifications are introduced, such as diamond OA referring to publishing in journals which do not charge any fees to authors or readers. Currently, one third of OA journals charge publishing fees, while others receive institutional, governmental, or third-party funding (Kurata, Morioka, Yokoi, & Matsubayashi, 2013).

4.1.2 Open Access and Biomedical Research

As presented in Figure 8, the volume of open access publications has tremendously increased for the major scientific disciplines, with the biomedicine domain showing a growth of more than 16 times in number of OA articles published between 2000 and 2011. In fact, according to a study in 2013, OA has shown tremendous growth in the biomedical field with more than 50% of OA articles coming for it (Kurata, Morioka, Yokoi, & Matsubayashi, 2013).

One of the main topics for debate over OA publishing focuses on its assumed negative effect on the quality of scientific publishing. However, recent findings (Laakso & Björk, 2012) show that OA journals, and in the medical and health domain in particular, which are indexed in Web of Science and/or Scopus and are published in the four largest publishing countries show the same scientific impact and quality with subscription journals. Interestingly, OA journals which pose article processing charges in order to fund publishing are on average cited more than other OA journals.

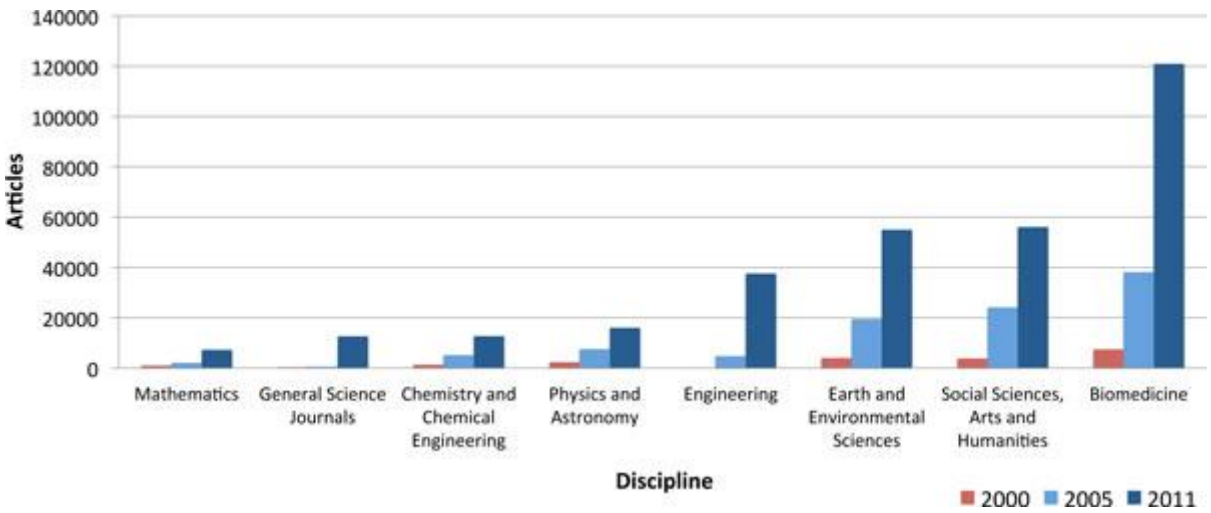

Figure 8: Open Access Articles across different disciplines.

4.2 Pilot 1:Open-access Data journals development

4.2.1 Analysis of Different Business Models and Competitors

To meet the cost of publishing, authors who publish open-access are asked to pay an open access fee or article-processing charge (APC) per published paper. This cost is usually covered by research funds from the departments that contribute to this work.

To partially remove this burden from the individual authors, some publishers have created different ***Membership programs***. A Membership Program enables academic and research institutions, societies, groups, funders and corporations to actively support open access in scholarly publishing, and help ensure the most widespread dissemination of the work published by their researchers or members. Depending on the type of Membership, Member institutions cover some or all of the publication cost for their individual researchers when they submit to a certain publisher.

Three different types of Membership have been described :

1. **Prepay Membership**
   Enables an institution to cover the whole cost of publishing with no additional fees paid by their authors.
2. **Shared Support Membership**
   The cost of publishing is split between the institution and author.
3. **Supporter Membership**
   Members pay a flat rate annual Membership fee based on the number of science and medical researchers and graduate students at their institution. A 15% discount on the article-processing charge (APC) is given when publishing in the journals.

The number of funding research organizations that adopt policies to promote open-access to scientific information. These organizations could be a source of funding for the Biomedical data Journal. The following table provides information on funding organizations from around Europe and the open access policies they have in place.

Organization	Country	OA policy	OA Funding
Fonds zur Foerderung der wissenschaftlichen Forschung (FWF)	Austria	Yes	Yes
Research Foundation Flanders (FWO)	Belgium	Yes	Yes
Centre national de la recherche scientifique (CNRS)	France	Yes	Yes
INSERM (Institut national de la sante et de la recherche medicale)	France	Yes	Yes
Deutsche Forschungsgemeinschaft (DFG)	Germany	Yes	Yes
Max Planck Society	Germany	Yes	Yes
Hungarian Scientific Research Fund (OTKA)	Hungary	Yes	Yes
Science Foundation Ireland (SFI)	Ireland	Yes	No
ConsiglioNazionale delle Ricerche (CNR)	Italy	Yes	Yes
Telethon	Italy	Yes	Yes
Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NWO)	Netherlands	No	Yes
Consejo Superior de Invesigaciones Científicas (CSIC)	Spain	No	Yes
RiksbankensJubileumsfond	Sweden	Yes	Yes
Swedish Foundation for Strategic Research	Sweden	No	Yes
Swedish Research Council	Sweden	No	Yes
Swiss National Science Foundation (SNF)	Switzerland	No	Yes
Breakthrough Breast Cancer	UK	Yes	Yes

Organization	Country	OA policy	OA Funding
British Heart Foundation (BHF)	UK	Yes	Yes
Cancer Research UK	UK	Yes	Yes
Research Council UK (RCUK)	UK	Yes	Yes
Wellcome Trust	UK	Yes	Yes

Table 30: European Open-Access Funders.

The following table provides information about competitor journals for BMDJ.

Competitor	Brief Description	Relation to OpenScienceLink
Scientific Data Journal (Nature Group)	Starting May 2014, this data journal will allow for the publishing, discovery and reusing of research data. http://www.nature.com/scientificdata/about/	Different scientific focus for the data
Linked Open Data from University of Münster (Germany) LODUM	LODUM aims at connecting different data sources across the 15 faculties and departments at the University of Münster through the implementation of Open Access and Linked Open Data principles across the university. http://data.uni-muenster.de/	Potential content source
OpenAire EU project	The FP7 project OpenAIRE aimed at offering the means to promote and realize the widespread adoption of the Open Access Policy by aggregating research publications which comprise European funded research output. OpenAIREplus, being its successor, further aims at linking this data to the accompanying research and project information, datasets and author information. Apart from the data, it also provides a series of functionalities such as statistics and reporting tools which can be useful to project managers. http://www.openaire.eu/	Potential Content source Planning to sign a MoU
re3data	It is a global registry of research data repositories from different academic disciplines which is funded by the German Research Foundation (DFG). http://www.re3data.org/	Potential Content source
myExperiment	It comprises a public repository of scientific workflows which is currently supported by three European Commission 7th Framework Programme (FP7) projects: BioVeL, SCAP and the Wf4Ever Project and the e-Research SouthandmyGridEPSRC Platform grants. http://www.myexperiment.org/	Potential Content source

Competitor	Brief Description	Relation to OpenScienceLink
Open PHACTS	The Open PHACTS Discovery Platform integrates pharmacological data from a variety of information sources and offers tools and services for applying questions on this data with an aim to facilitate pharmacological research. http://www.openphacts.org	Potential Content source
Biodiversity Data Journal	The first issue of the *Biodiversity Data Journal*, featuring 27 articles, appeared in its final version in September 2013. BDJ is published by Pensoft Ltd., Bulgaria. http://biodiversitydatajournal.com	Potential Content source, if the OpenScienceLink domain broadens. Potential publisher and editor who could benefit from the data journal management and review services and additionally the trend mining and scientometrics services.
Geoscience Data Journal	At the end of November 2013, five articles appear on the website of the *Geoscience Data Journal*, including the lead editorial article [20]. The journal is published by Wiley. http://onlinelibrary.wiley.com/journal/10.1002/%28ISSN%292049-6060	
Journal of Open Archaeology Data	The *Journal of Open Archaeology Data* is published by Ubiquity Press. The first volume with nine articles appeared in 2012. As of end November 2013, volume 2 features two data articles. http://openarchaeologydata.metajnl.com	
Journal of Open Psychology Data	The *Journal of Open Psychology Data* is also published by Ubiquity Press. By the end of November 2013 the journal website provides access to two articles, one of which is the editorial article. http://openpsychologydata.metajnl.com	
GigaScience	It is a journal which publishes 'big-data' studies from the entire spectrum of life and biomedical sciences. It is with BioMed Central and supported by BGI – a Chinese non-profit organisation which claims to be the largest genomics organisation. It is indexed in the Directory of Open Access Journals (DOAJ), PubMed and PubMed Central.	Potential Content source, Publisher and Editor potentially interested primarily in data journal management and review services and additionally in the trend mining and scientometrics services.
Genomics Data	It is an open access journal published by Elsevier which covers all aspects of genome-scale analysis, including nucleic acids analysis, microarray and next-gen sequencing data and all organisms.	
Journal of Open Public Health Data	It is a data journal which is published by Ubiquity Press. Its main focus is on data with reusability potential or which can be used for research validation purposes.	
Scientific Data	It is a data journal to be published by Nature Publishing Group which currently focuses on datasets from the life, biomedical and environmental science communities, but is intended to cover a broad range of scientific disciplines. It has been scheduled to launch in May 2014. Datasets are not hosted by the publisher. Instead community-recognised data repositories are expected to store them, if available, or other repositories such as the Dryad.	

Table 31: Pilot 1 Competitors.

4.2.2 Insights for the formulation of realistic business and sustainability plans

A. Spendings per year

	Activity	Rough cost estimate
A0	Policies, business process, legal issues	OSL
A1	Website and presence in social networks Initial development, software and functionality upgrades, expanding the presence in social networks	2,000
A2	Journal management 1/2 position, bachelor's degree, working knowledge of English, some understanding of biomedical issues (2,500 Euro per month, including social and other insurance, including the insurance paid by the employing company) = 12 months x 1,250 Euro per month (article processing, e.g. page setting, is included here)	15,000
A3	Printing 4 issues x 1,500 Euro (4 colours cover, the usual issue is with black and white body; when necessary, individual pages /galley/ way be printed in colour; printout – between 300 and 500 copies; format – A4)	6,000
A4	Advertising the journal (online, in specialised magazines, at relevant conferences, etc.)	2,000
	Sub-total	25,000
A5	Overhead, 20 % Office space & equipment, consumables, communications, web hosting, etc.	5,000
	Total	**30,000**
A6	Return of Investments, 20 %	6,000
A7	Required annual revenues	**36,000**

Table 32: Spendings for Pilot 1.

B. Possible revenues

	Sources	Required revenues
B1	Sale of printed copies including by subscription Euro 20 per sold copy (above packaging, posting, and transaction costs), 100 copies sold of each issue = 4 x 100 x 20	8,000
B2	Advertising in the journal	2,000

B3	Direct support by an agency or programme supporting open access	2,000
B4	Author's fees (institutional membership may provide stability and increase predictability, but is not expected to increase revenues, since it will lead to waiving authors' fees) 4 issues x 15 articles per issue in average = 60 articles **Fee of 400 Euro per article** (or an equivalent amount for an institutional membership) Remark: Fees for publications by members of the Editorial Board and 'active' reviewers may be waived. Hence, this calculation is based only on the number of articles for which authors are requested to pay the fee.	24,000
	Total	**36,000**

Table 33: Possible Revenues for Pilot 1.

Possibilities to reduce costs:

Increase the efficiency of journal management and journal preparation

1. Assign a person with lower qualification to manage the journal (not desirable).
2. Seek synergies by assigning the same person to manage three or four journals.
3. Request that authors use a dedicated writing tool (that provides the articles in print-ready form).
4. Milder form of the above requirement – provide templates in commonly used software tools and request that authors use the one they are used to.
5. Request that articles be written in a language that does not require copy-editing.
6. Provide paid services for formatting submissions to journal requirements (in case a contribution is not formatted according to journal requirements)
7. Provide paid copy-editing services for cases when a contribution is not written with acceptable quality of language.

Selected examples of author's fees for publication in open access journals:

Journal	At launch	Regular	Remark
Biodiversity Data Journal, Pensoft	0	"a minimal fee ... that anyone can afford"	Manuscripts must be written in their own 'writing tool,' or from integrated external platforms, such as Scratchpads or GBIF Integrated Publishing Toolkit
Geoscience Data Journal, Wiley	n/a	$1,500	
GigaScience (~BioMed Central)	0	0	Thanks to the support by BGI
Journal of Open Public Health Data, Ubiquity Press	0	0	"covered by funding"
Genomics Data, Elsevier	$ 100	$ 500	Additional charges if formatting and copy editing is necessary
Scientific Data, Nature Publishing Group	-30%	$ 630/700	Depending on the type of Creative Commons License
Journal of Defense Management, OMICS Group	$ 1,300	$ 1,300	Do not seem to have considerable number of contributors. Members of the Editorial Board publish free of charge

Table 34: Examples of author fees for publication in OA journals.

<u>Increase revenue predictability and direct support</u>

- Seek support by funding agencies
- Seek support by academic libraries, foundations, corporations, etc.

4.3 Pilot 2: A novel open, semantically-assisted peer review process

4.3.1 Analysis of different business models and competitors

Competitor	Brief Description	Relation to OpenScienceLink
EasyChair	EasyChair facilitates conference organisers in the refereeing process through: - management and monitoring of the program committee; - management of the access of PC members and referees to papers and conflicts of interests; - automatic paper submission; - paper assignment based on the indicated preferences of PC members; - submission of reviews; - notification of PC members, referees and authors via e-mail; - online discussion of papers; - the author response (aka rebuttal) phase, when the author can respond to the reviews; - automatic preparation of conference proceedings http://www.easychair.org/	EasyChair focuses on the management of the peer review process for conferences, with its main services being the mapping between submitted articles and members of the existent Program Committee of a conference. No intelligent mechanisms are provided, the articles are unlinked from literature and reviewers' selection is only based on their declared interests.
FluidReview	FluidReview is an application management and review system, which allows hosting peer reviews online for scholarships, grants, proposals, fellowships, journal articles, etc. It facilitates the appointment of reviewers for specific submissions or the entire collection and provides customized ranking and evaluation forms & tasks. Reviewers can perform their tasks collaboratively through comments and annotations. http://fluidreview.com	It mainly focuses on application and submission management, with the review process being facilitated mainly through customisable forms, storing of submission material and statistics (such as number of reviews under processing, etc.). No tools for comparing applications and no linking with or search through literature is provided.
Public Knowledge Project - Open Journal Systems	OJS is open source software made freely available to journals worldwide for the purpose of making open access publishing a viable option for more journals. OJS assists with every stage of the refereed publishing process: It follows articles from submission, through peer review, copyediting, layout editing, proofreading, and on to publication.	OJS includes some of the functionality of OSL for the management of the journal publication and review processes. However, it is lacking the focus on reviewing and indexing datasets, and appropriate reviewers are not suggested automatically.
ArnetMiner	ArnetMiner recommends reviewers based on title, authors, abstract, and venue (conference/journal). The recommendations are presumably based on the "academic social network" that is the core of ArnetMiner. http://arnetminer.org/reviewer-home	ArnetMiner does not include datasets, and it is unclear what the reviewer suggestions are based on.

Table 35: Pilot 2 Competitors.

Service Provider / Service	OpenScience Link	EasyChair	FluidReview	ArnetMiner	Knowledge Project - Open Journal Systems
OpenScienceLink Pilot 2 functionalities					
Paper-based reviewers suggestion	+	-	-	+	-
Review support	+	-	-	+	-
Review form submission	+	+	+	+	+
Open-identity post-review discussion	+	-	+	-	-
Focusing on the life sciences	+	-	-	-	-
Costs	-	-	+	-	-
Help/tutorials/documentation					
Online help	+	http://www.easychair.org/faq.cgi	-	http://arnetminer.org/reviewer-home	http://pkp.sfu.ca/wiki/index.php?title=OJS_Documentation
Video tutorials	+	+	http://fluidreview.com/videos	-	-
Contextual help	+	-	-	-	-

Table 36: Pilot 2 positioning of competitive products

4.3.2 Targeted customers and stakeholders.

Customer/Stakeholder	Why to use the Platform
Researchers	Assure relevant classification of own datasets and papers and thus facilitate the identification of most suitable reviewers; Gain experience as reviewers .
Evaluators	
Publisher	Speed up and ensure high quality of the review process. Improve their own submission platforms by using the offered services that support a semi-automated review process.
Editor	To find more reliably competent candidate reviewers for their journals and to get an indication of the reviewer's track record.
Research Sponsors and Funding Authorities	Seek guarantees that published results (e.g. datasets) of sponsored research have been subject of rigorous review of high quality.

Table 37: Pilot 2 targeted customers and stakeholders

Customer/Stakeholder	Brief Description	Why to use the Platform
SpringerOpen	Publisher	Expressed interest in reviewer suggestion and suggested including "reviewer score".
Elsevier	Publisher	Electronic Manuscript Submission System (EMSS) currently doesn't offer automatic assistance for carrying out the review process or automatic selection of qualified reviewers.
Nature Group	Publisher	Reviewer suggestion functionality potentially relevant for "Scientific Data" data journal.

Table 38: Examples of Pilot 2 targeted customers and stakeholders

4.4 Pilot 3: Services for detection and analysis of research trends

4.4.1 Analysis of different business models and competitors

Competitor	Brief Description	Relation to OpenScienceLink
TechCast	TechCast offers online technology forecasts and technology articles on emerging technologies which are based on scanning of the literature and media, interview authorities, and other sources by their researchers in order to identify trends and background data on roughly 70 emerging technologies. Their website pools background data and the knowledge of 100 experts worldwide to forecast breakthroughs in all fields and to assess their economic and social impact. TechCast researchers and editors scan the literature and media, interview authorities, and draw on various other sources to identify trends and background data on roughly 70 emerging technologies. This data is summarized to guide the estimates of 100 plus technology officers, research scientists and engineers, scholars, and other experts to estimate of the most likely year each breakthrough will occur, the potential economic demand, and experts' confidence. TechCast also offers comprehensive technology consulting services as well as customized technology forecasting and studies. http://www.techcast.org/	It focuses on the technological world and provides standard lists for trends in specific areas. OpenScienceLink could actually be provided to the TechCast experts for facilitating their work in literature scanning and trend analysis.
The Millennium Project	**The Millennium Project** is an independent non-profit global participatory futures research think tank of futurists, scholars, business planners, and policy makers who work for international organisations, governments, corporations, NGOs, and universities. The work is distilled in its annual "State of the Future", "Futures Research Methodology" series, special studies, and integrated into this Global Futures Intelligence System. Its primary products **include:** - **On-going assessment of the most significant long-range issues and opportunities, and focused analysis of policies and agencies to address them;** - **Communications network of futurists and scholars with an international futures research information system with public access;** - **Advanced training in the methodology and analysis of critical issues, opportunities, and challenges of the future.** **Moreover, it produces:** - **The annual State of the Future report which is based on integration of the Project's work as well as others' forecasts, and previous years' reports;** - **Special studies such as Future Issues of Science and Technology, Futures Research Methodology, Middle-East Peace Scenarios and Future of Africa;** **It includes discussion rooms and mailing lists and manages a coherent and cumulative process that collects and assesses judgments from over 3,500 people.** http://www.millennium-project.org/index.html	It covers a wide spectrum of domains, from climate change and energy to health and peace, rather than focusing on one domain. It depends on experts input and analysis and provides a rather high-level analysis of trends and opportunities. OpenScienceLink is focused on the biomedical domain and provides flexibility in identifying trends with primary input found in literature and published scientific findings in general. Moreover, it provides great granularity concerning the trends identified, from fields (such as cardiology) to specific topics (such as a gene and its relation to a disorder). The OpenScienceLink platform could be

Competitor	Brief Description	Relation to OpenScienceLink
		potentially used by the Millennium Project as a toolset for identifying and analysing trends in the biomedical domain.
ArnetMiner	ArnetMiner provides hot topics based on data processed from the Web. Its trend identification is based on their Author-Conference-Topic (ACT) model, through which they automatically discover 200 hot topics from the publications. For each one of these topics, it offers word trends across the past years, popular phrases. It also provides a search for the trend analysis of a specific topic. Moreover, scientists are presented with the identified hot searches, hot topics and scientists for a specific topic. http://arnetminer.org/	It does not allow the researcher to customise their trend analysis but rather provides the same set of results for hot topics to all or presents the trend analysis for a topic that the user introduces to the platform. It focuses on the ICT domain.
TrendMiner Project	The goal of the Trendminer project is to deliver innovative, portable open-source real-time methods for cross-lingual mining and summarisation of large-scale stream media (e.g. weblogs, Twitter, Facebook). TrendMiner will achieve this through an inter-disciplinary approach, combining deep linguistic methods from text processing, knowledge-based reasoning from web science, machine learning, economics, and political science. Results are validated in high-profile case studies: financial decision support (with analysts, traders, regulators, and economists), political analysis and monitoring (with politicians, economists, and political journalists), detection of psychosocial states and social information, and detection of discussions on medicine and drug effects in social media. http://www.trendminer-project.eu/index.php/obj	TrendMiner discovers new trends on the basis of social media. It depends on weakly supervised machine learning algorithms for automatic discovery of new trends and correlations.
Google Trends	Google Trends analyzes a percentage of Google web searches to determine how many searches have been done for the terms you've entered compared to the total number of Google searches done during that time. Google Trends performs a breakout analysis to show "rising searches". Rising searches are searches that have grown significantly in popularity over a given time period when compared to a preceding time period. http://www.google.com/trends/	Google Trends does not provide automatic trend detection, it is more a trend visualization tool for a (small) set of keywords. It covers scientific and life science terms. It limits the user to a maximum of 5 compared terms in one graph. It provides the user only with relative values, no absolute volumes are depicted.

Table 39: Pilot 3 Competitors.

4.4.2 Insights for the formulation of realistic business and sustainability plans

Trend analysis is according to many different sources the base for decision making today and especially in the future. The availability and – more – important the accessibility of big data volumes ask for tools to interpret available data. The big financial potential lies behind the analysis of trends in order to be able to create products when they are needed. Companies being able to deliver custom tailored products when they are needed most will have a unique selling point and will therefor be better than competitors. As a good example a US based company GenomeQuest do trend analysis in the area of Bioinformatics – specialized in gene sequences in patents. The companie's revenue has doubled every year and is now at around 10 million US dollars. Such a simple business model not even providing advanced statistical and/or semantic algorithms allows for such a tremendous growth.

The technologies developed in Open Science Link will go far beyond what players like GenomeQuest do. We foresee a CAGR of 15 to 30 % in the area of trend analysis. In 2016 the global marked will have reached a state where especially Europe should be stable positioned before global M&A deals start. Our "product" will by than be is in fully developed state and beyond state of the art.

To estimate expected revenues would be too early and depends also on marked approaches.

4.5 Pilot 4: Services for Dynamic Researchers' Collaboration

4.5.1 Analysis of different business models and competitors

Competitor	Brief Description	Relation to OpenScienceLink
Research Gate	ResearchGate comprises a social networking site for scientists to share papers, ask and answer questions, and find collaborators. It has been described as a mash-up of "Facebook, Twitter and LinkedIn" that includes "profile pages, comments, groups, job listings, and 'like' and 'follow' buttons". Members are encouraged to share raw data and results from both failed and successful experiments. Based on the scientist's profile, it regularly suggests papers of their interest for reading, which then the person may request from the author through the platform. Job announcements are also provided. It offers a series of statistics which can be shared in Facebook, LinkedIn, Twitter and g+. https://www.researchgate.net	Each scientist joining the portal is encouraged to enter information about their papers, including the document itself. Annotation of the papers is requested by their authors. Hence, it includes manual processes for its services provision. Linking among its members is based on declared relationships, based on their institutions, submitted paper keywords and manually entered research interests.
ArnetMiner	ArnetMiner provides search and mining services for researcher social networks. In particular, it creates a semantic-based profile for each researcher by extracting information from the Web and integrates academic data (e.g., the bibliographic data and the researcher profiles) from multiple sources. Moreover, it analyzes and discovers patterns from the built researcher social network. The main search and analysis functions in ArnetMiner include: Profile search, Expert finding, Course search, Sub-graph search. http://arnetminer.org/	It is an interesting platform which allows for finding experts as well as comparing them based on a series of factors. Based on the person's profile it offers recommendation of collaborators. Although not a domain-focused platform, it mainly focuses on ICT.
MyScienceWork	MyScienceWork is a communication platform including more than 31 million open access publications from over 30 disciplines. It includes an international community of researchers, engineers, students and science communicators. Users are allowed to comment upon and annotate publications. Moreover, job announcements are available. http://www.mysciencework.com/#the-research-network	Contacts are suggested based on the profile that the researcher creates manually in the system. It does not focus on a particular domain. It processes data only from open access journals.
Academia.edu	Academia.edu is a platform for academics to share research papers and view analytics on their profiles, which include number of profile views, number of document views and followers. https://www.academia.edu	It is greatly based on manual data entrance on behalf of the researchers. It mainly focuses on publication sharing. It does not focus on a particular domain.

Competitor	Brief Description	Relation to OpenScienceLink
Methodspace	Methodspace is an online network of researchers for sharing research, resources and debates. Methodspace users have free access to selected journal articles, book chapters, etc. which highlight emerging topics in the field. http://www.methodspace.com/	Connection with other researchers is mainly done through discussions about topics and participation in fora. It does not focus on a particular domain.
BiomedExperts	Scientific professional network that "connects biomedical researchers through the display and analysis of the networks of co-authors with whom each investigator works to publish scientific papers. The comprehensive system of pre-populated expert profiles, coupled with the ability to analyze all associated professional connections within the co-author network, allows scientists and researchers across organizations the ability to share data and collaborate in ways never before considered" (biomedexperts.com). http://biomedexperts.com	It is designed to a niche audience – biomedical researchers, who can (1) connect to each other through their virtual profiles, (2) explore their personal network based on co-authorship, (3) expand scientific collaboration, (4) connect to other scholars via the platform, (5) cultivate and grow their professional network.
Microsoft Academic Search	It is an experimental research service designed to explore how scholars, scientists, students, and practitioners find academic content, researchers, institutions, and activities. As is true of many research projects at Microsoft, this service is not intended to be a production Web site, and it will likely be taken offline when appropriate given the research goals of the project. http://academic.research.microsoft.com	

Table 40: Pilot 4 Competitors.

4.5.2 Insights for the formulation of realistic business and sustainability plans

The aforementioned players are a vital sign that collaboration can't be estimated high enough. As a strong trend in sciences, subjects get more and more complex and can not be investigated by one genius brain alone. The average number of authors of high-end publications (Nature, Science, Cell etc.) increases constantly. It is of crucial interest to provide tools for collaboration beyond todays habits: basically sending unstructured emails to possible collaborators. Data must be integrated, automatically analysed and a machine should be able to draw conclusions and suggest hypothesis to teams. In Open Science Link we partly aim for such new ways and generally speaking we see a huge market. One challengeable fact is that Research Gate raised 30 million € from The Gates Foundation.

4.6 Pilot 5:Research evaluation services

4.6.1 Analysis of different business models and competitors

Competitor	Brief Description	Relation to OpenScienceLink
Thomson Reuters Web of Science	Web of Science® provides researchers, administrators, faculty, and students with access to citation databases. Its content come from over 12,000 of journals worldwide, including Open Access journals and over 150,000 conference proceedings across more than 250 disciplines. http://thomsonreuters.com/web-of-science/	It presents evaluations based on citation metrics. The analysis provided is mainly on a journal basis. The OpenScienceLink models and evaluation services could be feeding the platform enriching the provided evaluation.
Thomson Reuters InCites	*InCites*™ is a customized, web-based research evaluation tool that allows researchers to analyze institutional productivity and benchmark their output against peers worldwide. With customized citation data, global metrics, and multidimensional profiles on the leading research institutions as well as with robust visualization and reporting tools, it allows for the creating and sharing of reports. Its main features include: • Comparison of quantitative and qualitative aspects of performance against other institutions and world and field benchmarks • Presentation of influential and emerging researchers and research trends • Identification of potential areas for growth • Monitoring of collaboration activity and tracking of new collaboration opportunities http://researchanalytics.thomsonreuters.com/incites/	It presents evaluations based on popular evaluation metrics. The OpenScienceLink models and evaluation services could be feeding the platform enriching the provided evaluation.
ResearchGate	It calculates a ResearchGate (RG) score based on the publications' views and downloads, who interacts with them and how often, the number of questions posed and answered and the number of followers. It also provides the scientist's positioning among its members in terms of the score in the form of a percentage.	The RG score includes a subset of the parameters that the OpenScienceLink will use for evaluating scientists. Moreover, it is rather rigid and does not allow for scientists to exclude a parameter that they do not consider important.
ArnetMiner	ArnetMiner presents researchers with evaluation for academics based on 8 measures; "H-index", "Citation", "Uptrend, "Activity", "Longevity", "Diversity, "Sociability", "New Star". Scientists in a field are ranked based on them. http://arnetminer.org/	It only provides scientists' evaluation. Although not a domain-focused platform, it mainly focuses on ICT.
GoogleScholar Metrics	Google Scholar Metrics is a tool for authors to evaluate the visibility and influence of recent articles in scholarly journals; it also helps authors as they consider where to publish their new research. Google Scholar Metrics provide with possibilities to (a) browse the top 100 publications in several languages ordered by their five-	It presents evaluations of journals based on popular evaluation metrics. The OpenScienceLink models and evaluation services

Competitor	Brief Description	Relation to OpenScienceLink
	year h-index and h-median metrics; (b) explore publications in research areas of your interest; (c) Scholar Metrics currently cover articles published between 2008 and 2012, both inclusive. http://scholar.google.lt	could be feeding the platform enriching the provided evaluation.
Harzing's Publish or Perish	Harzing's Publish or Perish is a freely available software program that presents with evaluation of author's impact and journal's impact based on a number of citation indexes (e.g., number of papers and citations, cites/year, h-index, g-index) according to Google Scholar and Microsoft Academic Search. http://www.harzing.com/pop.htm	It presents evaluations based on popular evaluation metrics. The OpenScienceLink models and evaluation services could be feeding the platform enriching the provided evaluation.
Microsoft Academic Search	Microsoft Academic Search indexes millions of academic publications. As is true of many research projects at Microsoft, this service is not intended to be a production Web site, and it will likely be taken offline when appropriate given the research goals of the project. In Microsoft Academic Search, objects in the search results are sorted based on two factors: (a) their relevance to the query; (b) a static rank value that is calculated for each item in the Microsoft Academic Search index. The static rank encompasses the authority of the result, which is determined by several details, such as how often and where a publication is cited.	It presents evaluations based on popular evaluation metrics. The OpenScienceLink models and evaluation services could be feeding the platform enriching the provided evaluation.
Scopus	Scopus features smart tools to track, analyze and visualize research. Scopus delivers an overview of the world's research output in the fields of science, technology, medicine, social sciences and arts and humanities. Scopus provide users with possibilities to: (a) Track citations over time for a set of authors or documents, with Citation Overview/Tracker; (b) View h-index for specific authors; (c) Assess trends in search results with Analyze Results; (d) Analyze an author's publishing output with Author Evaluator; (e) Gain insight into journal performance with Journal Analyzer and alternative journal impact metrics SNIP and SJR. http://www.elsevier.com/online-tools/scopus	It presents evaluations based on popular evaluation metrics. The OpenScienceLink models and evaluation services could be feeding the platform enriching the provided evaluation.

Table 41: Pilot 5 Competitors.

4.6.2 Insights for the formulation of realistic business and sustainability plans

Research evaluation is as important as trend analysis and can partly be based on or profit from it. As stated above, trend analysis and trend detection are key when it comes to be first mover. The demand for reliable, scientific correct measures is obvious. Doing trend analysis on mediocre designed indicators is rather senseless. So the first need is to create reliable indicators, which go beyond the above mentioned competitors. Open Science Link does exactly this. Having them at hand the next issue which can be addressed is flexibility which should range from researcher, to research group, to department, to University, to city, county and finally state. Also our multidimensional approach to focus for example on bioinformatics and being able to profile e.g. Europe against North America sets OSL apart from existing technologies.

All in all it can be named realistic, that our technologies bring added value to customers. Thereby the business model can be high jacked but extended to more flexibility, more accuracy and more semantic cross links for addressing meaning instead of “words”. Thinkable is selling single topics in a yearly subscription (e.g. Bioinformatics, Europe, 2015). Single individuals may get it cheap where Institutions get a higher priced product and so on.

Seeing the rough number from Thomson Reuters the market seems to be huge and fast growing. We estimate also here a CAGR of 10-20 %.

5 Summary and Conclusions

This report serves as an initial evaluation of the OpenScienceLink project from the perspective of interested stakeholders, technical achievements and business plans.

Based on stakeholders views, among the most important achievements in this first project period has been the development of the pilot specifications, the preparation and launching of the Biomedical Data Journal, and the actual alpha release of the OpenScienceLink platform. With regards to the most positive aspects of the platform in its current form, the three major points were: simple and clear interface, fast response time, and, up-to-date results. Stakeholders have also provided a number of suggestions/criticisms that are reported in this document and will be taken into account for improvement of the platform. Based on previously defined Key Performance Indicators (KPIs) we performed a comparison of the expected with the actual progress that has been achieved during the 1st year. As indicated in tables 1-23, the actual progress reported here has exceeded the anticipated progress in most KPIs.

Concerning the technical evaluation, most of the contacted tests were successful, and the first release of the platform was shown to work in a technically satisfactory manner.

Finally, from a financial point of view, we evaluated the overall market into which the platform and its services are positioned, the competitors and how their products relate to the ones developed within this project. A comparison of the OpenScienceLink pilot services with these products has been conducted in order to unveil advantages of the OSL platform over competitors. An initial analysis of potential strategic partners and business plans has been performed in regards to the sustainability of the OSL platform after the project's end.

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