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Information Research

Swiss S**y**stem for **M**onitoring bibliogra**ph**ic data and H**o**listic publicatio**n** behavior anal**y**sis" (SYMPHONY): Requirement analysis

Final report of the project SYMPHONY (142-008) in the swissuniversities program: SUC 2013-2016 P-2: „Scientific information: Access, processing and safeguarding"

Version 1.2 of September 2, 2015

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Management Summary

The objective of the "Swiss System for Monitoring bibliographic data and Holistic publication behavior analysis" (SYMPHONY) project was to set up a study that is able to monitor the publication behavior of researchers in Switzerland in systematic and continuing way. Due to the complexity of these tasks and the high number of stakeholders involved, SYMPHONY was conceptualized as a pre-study that identifies and analyses the requirements of the key stakeholders towards such as system.

Several methods have been used to reach the project goal: In a first step, a review of the international literature gave valuable insights in the potential, but also the problems associated with current approaches towards monitoring publication behavior by means of bibliometrics (e.g. bias against Open Access publication formats). As a second methodological step, the project team ran a stakeholder dialog that included 40 interviews with key stakeholders and experts in the field (all universities and most universities of applied sciences, a selection of research organizations, funding agencies, bibliometric experts etc.) This stakeholder dialog was necessary in order to take the considerable heterogeneity and decentralized structure of the Swiss science system into account. The interview partners were asked about their current practice of measuring the quantity and quality of scientific output with a focus on publication monitoring (technical infrastructure, financial resources, organizational guidelines and processes) and their needs and requirements for a new or adapted infrastructure.

The expert interviews have clearly shown that the majority of stakeholders in the Swiss science systems considers the current status quo of bibliographic data collection and publication analysis problematic because a number of scientific disciplines (social sciences and humanities) and a considerable amount of scientific publication formats (e.g. narrow selection of books and book chapters, exclusion of peer reviewed journals that are not included in the dominant bibliometric data base) are not adequately represented in the dominant bibliometric systems (e.g. Web of Science by Thomson Reuters). Based on the findings from the expert interviews, the project team has developed the following four scenarios: (1) maintain status quo, (2) perform targeted studies, (3) create a new infrastructure for monitoring the publication behavior of Swiss scientists, (4) scenario (3) plus a framework for assessing the societal impact of publications, projects and institutions.

These scenarios were presented to the experts and stakeholders at the project workshop with the opportunity to comment and to provide feedback. One important result of the workshop was that the participants recommended to focus on scenario 3 for the further project development by aiming at the creation of a new infrastructure with a clearly and narrowly defined task to monitor the publication behavior of Swiss scientists. Based on the feedback from the stakeholder workshop, the project team has developed a revised and detailed version of scenario 3 that was considered as best approach to meet the ambitious goals set by the White Paper. The final chapter list the requirements for the current and future monitoring of scientific publications in Switzerland and gives a preview on the planned follow-up project "SYMPHONY - Proof of concept".

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CERIF	Common European Research Information Format
CERN	European Organization for Nuclear Research
CONLL	Conference on Natural Language Learning
CRIS	Current Research Information Systems
CRISTIN	Current research information system in Norway
CRUS	Rectors' Conference of the Swiss Universities
CTI	Commission for Technology and Innovation
CWTS	Centre for Science and Technology Studies
DOI	Digital object identifier
DORA	Declaration on Research Assessment
ETH	Eidgenössische Technische Hochschule
HEP	High Energy Physics
HTW Chur	Hochschule für Technik und Wirtschaft Chur
IF	Impact Factor
ISBN	International Standard Book Number
ISI	Institute for Scientific Information
LDA	Latent Dirichlet Allocation
NASA-ADS	National Aeronautics and Space Administration - Astrophysics Data System
NLP	Natural Language Processing
OA	Open Access
ORCID	Open Researcher and Contributor Identification
P-2	Program SUC P-2: "Scientific information: access, processing and safe-guarding"
PDG	Particle Data Group
PLOS	Public Library Of Science

SBFI	Staatssekretariat für Bildung, Forschung und Innovation
SERI	The State Secretariat for Education, Research and Innovation
SLAC	Stanford Linear Accelerator Center
SNSF	Swiss National Science Foundation
SOAP	Study of Open Access Publishing
SPIRES	Stanford Physics Information Retrieval System
SUC	Swiss University Conference
SYMPHONY	Swiss System for Monitoring bibliographic data and Holistic publication behavior analysis

1 Introduction

The continuous and rapid developments in the sphere of information and communication technologies are a challenge not only for private companies and public administrations, but also for all institutions that are active in the field of research and higher education.

On that background, the Swiss University Conference (SUC) has launched its Program P-2 (2013-2016): "Scientific information: access, processing and safeguarding" and the Rectors' Conference of the Swiss Universities (CRUS) has been tasked with carrying out the program. The CRUS stated self-critically that "the current organizational structure – whereby each university operates its own information provision and IT – is now outdated" (Rectors' Conference 2014: 5). The vision of this program was sketched in the following sentences: "The P-2 program envisions a future where academic needs for information handling and processing are seamlessly supported by a Swiss information provisioning and processing infrastructure that transcends the borders of individual institutions. The program shall strengthen Switzerland's reputation as a top location for education and research and as an attractive partner in international research collaboration." (Rectors' Conference of the Swiss Universities, 2014, p. 5).

One field of activity in the P-2 program is entitled "E-Publishing" and aims at "making publications, objects and data more widely available" (Rectors' Conference of the Swiss Universities, 2014, p. 29). The project "Swiss System for Monitoring bibliographic data and Holistic publication behavior analysis" (SYMPHONY) Requirement Analysis is an element of that E-Publishing field. It focuses on the following implementation action:

"EP-2: Setting up a study to monitor the publication behavior of researchers in Switzerland." (Rectors' Conference of the Swiss Universities, 2014, p. 29).

According to the "White Paper", the goal of this implementation action is to provide "figures indicating the publication behavior of researchers in Switzerland" and to give "the option of updating them at regular intervals" (Rectors' Conference of the Swiss Universities, 2014, p. 27).

What is the speed and the success of Open Access public formats in contrast to traditional scientific publication formats? This is an important research question that cannot be answered by given data and traditional approaches of bibliometric research. Open Access is widely regarded as a cornerstone of a modern, transparent, and effective scientific system. National scientific systems which foster and promote Open Access in the everyday scientific practice will increase the quality of scientific output, the dissemination of scientific knowledge into the society and promote interdisciplinary research. However, conventional systems and tools used to measure the quantity and quality of scientific output are biased against Open Access publications and other new forms of publication. They enforce a view on scientific communication

which seems more and more antiquated and has become increasingly counterproductive because grants and careers in science are bound to those systems.

The project SYMPHONY Requirement Analysis has made some first steps that should be able to pave the way for resolving this challenging and contradictory situation. It addresses the need for new approaches in monitoring Swiss scientific publications by proposing several realistic and consistent solutions (scenarios) for a "Swiss System for Monitoring bibliographic data and Holistic publication behavior analysis" (SYMPHONY) that are able to solve the problems mentioned above.

This report is structured in the following chapters:

Chapter 2 gives an overview on the state of the art and a review of the scientific literature. Bibliometrics is the key discipline that provides figures that can be used as indicators of the publication behavior of researchers. However, the way bibliometric data is gathered today and analyzed is systematically flawed against a number of scientific disciplines (e.g. social sciences, humanities) and against many important scientific publication formats (e.g. narrow selection of books and book chapters, exclusion of peer reviewed journals that are not included in the dominant bibliometric data base). These and other pitfalls and potential of bibliometrics are discussed in chapter 2.

Chapter 3 describes the methodology that has been used for the development of the scenarios that need to take the considerable heterogeneity of the Swiss science system into account. Therefore, the study starts with a stakeholder dialog (40 interviews with 44 individuals) which involves key players (research organizations and universities, funding agencies, policy makers etc.) on their current practice of measuring the quantity and quality of scientific output with a focus on publication monitoring (technical infrastructure, financial resources, organizational guidelines and processes) and their needs and requirements for a new or adapted infrastructure. Establishing such a stakeholder dialog is a necessary and also promising way to meet a key requirement postulated in the White Paper, namely to use existing services wherever possible, and to expand them (if necessary) in order to provide a national service (see Rectors' Conference of the Swiss Universities, 2014, p. 6). An additional element of the stakeholder dialog was a workshop during which the experts could comment and provide feedback on the preliminary results. The methodology of this workshop is also described in this chapter.

Chapter 4 presents the results of the various methodological approaches (literature review. expert interviews and expert workshop). Based on the findings from the experts' interviews, the project team has developed the following four scenarios for improving the infrastructure for monitoring and analyzing the publication behavior or researchers in Switzerland.

(1) Maintain status quo

(2) Perform targeted studies

(3) Create a new infrastructure for monitoring the publication behavior of Swiss scientists

(4) Scenario (3) plus a framework for assessing the societal impact of publications, projects and institutions

These scenarios are not independent, but rather build upon each other (e.g. scenario 2 includes scenario 1 etc.). These scenarios were presented to the experts and stakeholders at the project workshop with the opportunity to comment and to give feedback. One important result of the workshop was that the participants recommended to focus on scenario 3 for the further project development by aiming at the creation of a new infrastructure with a clearly and narrowly defined task to monitor the publication behavior of Swiss scientists.

The concluding chapter 5 integrates the insights from all preceding chapters. Based on the feedback from the stakeholder workshop, it presents a revised and detailed version of scenario 3 that was considered as best approach to meet the ambitious goals set by the White Paper. The final chapter lists the requirements for the current and future monitoring of scientific publications in Switzerland and gives a preview on the planned follow-up project "SYMPHONY - Proof of concept". The authors conclude that continued and coordinated efforts are needed in order to build such a new infrastructure that is vital for increasing the international visibility of Swiss research, removing the current bias in the evaluation of publication behavior and for supporting research organizations and policy makers in their efforts to analyze and evaluate research behavior as well as to measure the effects of new policies (e.g. the promotion of Open Access).

2 State of the Art - Literature Review

The following chapter serves as a short introduction into the topic of bibliometrics, its advantages and disadvantages as well as alternative measurement methods. Furthermore it offers a short introduction to the technicalities of information extraction and named entity linking.

2.1 Bibliometrics and its pitfalls

Bibliometrics, a methodology originally designed in the field of library and information science in the late 1960s (Norton, 2010), has become a major tool for benchmarking science, both on the level of individual scientists or groups of scientists and on the level of institutions and bigger entities like universities or entire countries. The main thesis of bibliometrics states that by counting the citations of scientific papers and merging them into networks of citations, it should be possible to formulate accounts on (a) the relevance of specific papers, scientists or research institutions, (b) the past networks of scientific knowledge production, and (c) future directions those networks will take. By using citations of actual scientific papers, mostly peer reviewed ones, those analysis should be able to formulate accurate accounts on the productivity of scientists and the impact of scientific papers without any knowledge of the actual content or underlying structures of scientific work, since scientist with this specific knowledge have already chosen to write those texts, cite other texts that are relevant and scientific communities have chosen to publish those texts.

Funding agencies, actors in the field of the politics of science and university management have become used to applying bibliometric synopses and figures to the processes of decision making, strategic planning and the evaluation of scientist and research institutions. (See as an example Staatssekretariat für Bildung, Forschung und Innovation, 2015) This form of bibliometrics has been improved and differentiated constantly to capture a better picture of the outcome of scientific institutions and infrastructures (see e.g. Pastor, Serrano, and Zaera (2015) for an european discussion of the difficulties of a bibliometric comparison of higher education institutions; Minguillo, Tijssen, and Thelwall (2015) for the innovative impact of science parks; Cavero, Vela, Cáceres, Cuesta, and Sierra-Alonso (2015) for the history of female authorship in computing science). Reding, Gumpenberger, Ovalle-Perandones, and Gorraiz (2013) proposed and tested the differentiation of bibliometric studies on scientific institutions into three levels: Macro (global), Meso (a country) and Micro (an institution).

Nevertheless: This usage of bibliometrics also gained a great deal of criticism, both because this form of usage has been perceived as unfair and fragmentary in reference to what scientist actually do and because this form only uses a small segment of the possibilities of bibliometrics. (E.g. Costa, 2015)

For long, this simple concept has been implemented, e.g. in the calculation of the infamous Impact Factor (IF), by selecting specific scientific journals as basis for the counting and measurement of citations. The concept has been refined again and again, e.g. with classifications of different forms of citation (approving, disapproving, referencing etc.), the usage of different sets of journals or publication forms as basis for the citation analysis and the like (Norton, 2010). Ding et al. (2014) gave an outline of such different improvements of "pure bibliometrics" over the decades. The outline clears up two things: First, there is a long tradition of suggested improvements of bibliometric processes, driven by a vivid community of researchers, testing such improvements for usability and reasonableness. (See e.g. Aman (2015) on the "regionalization" of the often used database Web of Science.) And secondly, the possibilities of bibliometric analysis tend to increase over time with the advancement of the technology used for scientific communication as well as bibliometric analysis. Unfortunately, these lively discussion seldom finds recognition by actors of the politics of science that continue to use simple bibliometric statements for political decisions.

In recent years, different schools and approaches like altmetrics or entitymetrics have emerged, which aim to expand the coverage and meaningfulness of citation analysis. All of them are based fundamentally on the same basic ideas and methodological approaches of bibliometrics. Since bibliometrics began to gain influence beyond the field of libraries, a tradition of different strands of criticism of bibliometrics started. (Figure 1) One such strand is represented by Wan and Liu (2014), who argue that the analysis of citations could lead to much deeper and more complex knowledge on scientific communication and the influence of science, if citations are not considered as always the same, but as contextual. This strand of criticism aims to improve bibliometrics by contextualizing data and metrics. (Figure 1, Strand 2)

Another strand utters to find other and better metrics that should represent the reality of science more adequately. (Figure 1, Strand 1) Notably different funding agencies, which recently signed the San Francisco Declaration of Research Assessment (i.e. DORA Declaration on Research Assessment, 2012) (including the Swiss National Science Foundation), are seeking for such new ways (Mohammadi, Thelwall, & Kousha, 2015).

In Switzerland, a project and its follow-up ("Mesurer les performances de la recherche," 2013 and "Performances de la recherche en sciences humaines et sociales" (Rahier & Loprieno, 2012; Zürcher, 2015)) - both sponsored by the Swiss conference of universities, now Swissuniversities - aimed to understand the usage of bibliometric factors in different fields of the humanities and social sciences. One project aim was to introduce and generalize the usage of bibliometric techniques to the participating universities as well as the development of instruments which should measure aspect that where usually not measured by bibliometric tools ("Mesurer les performances de la recherche," 2013, p. 2). The project now aims to establish a system of per-

manent measurement of the quality of scientific output of Swiss universities, both benchmarking those outputs into the international scene and respecting the different cultures in the different fields of science. One recurring argument in this project is that those different cultures make it difficult to compare different fields of science while at the same time those differences are important for the quality of research in each of those fields (Rahier & Loprieno, 2012). This outcome is consistent with the international discussion.

Analysing the literature on bibliometrics in depth, one thing became clear: While the literature and critique on bibliometrics is concerned with the real and possible usages on bibliometric tools, it produces a blind spot - the actual acceptance of such usage by researchers and funding agencies. Most of the literature argues that the usage as benchmarking tool is a duty in modern science and a necessity for the governance of science. While big funding agencies use it that way, there seems to be no awareness of the ambiguous application of different forms of bibliometric tools in smaller funding agencies, different research field and academic institutions. In view of the fact that several projects aiming to implement bibliometric systems failed, this is both startling and risky. (Figure 1, Strand 4)

2.2 Using Bibliometrics beyond Benchmarking

Most of the debate on bibliometrics is aimed at its widespread use as benchmarking tool, but this is only one simple form of its application. Since decades, the research on bibliometrics has focused on other possible applications.

Quite often such studies use modified forms of bibliometric analysis to gather information on scientific communication, the work of scientist or ways of scientific advancement without benchmarking or evaluation of perceived quality. Those approaches assume that scientists leave traces of their work in their strain of publications and citations, which can be made graspable for examination. The study of Moed and Halevi (2014) is but one example of this strand of research. It uses bibliometrics as tool for tracking the migration movements and range of collaboration of scientist via their publications. Mas-Bleda, Thelwall, Kousha, and Aguillo (2014) use bibliometric tools and other data to examine the usage of social media tools by scientists and can show a cumulation of tools used by those scientist who use several media tools in parallel.

Using a combination of other sources and theory traditions, such studies can lead to a better understanding of the sociology of science. Wouters (2014) pleads explicitly for the usage of bibliometric citation analysis for such a sociology of citations cultures and - thought further - scientific cultures. Others, like Campani and Vaglio (2015), advance theory construction for the understanding of the progress of science built on the basis of bibliometric data.

Taken together, this strand of research rejects the idea of using bibliometrics for simple and fast rankings of scientist and instead pleads for a usage as tool for a deeper understanding of scientific work. Usually these studies show on a smaller scale that such an approach could be useful, although most often they are not as easy to implement as rankings like the impact factor. Such tools could also be used by persons in authority of the governance or funding of science, although up until now they are not used as such.

2.3 Altmetrics and Other Developments

While bibliometric analysis are concerned with the counting and appraisal of citations of journal articles and - to a lesser degree - book chapters and books, communication in science does not happen just in those mediums alone. Especially since the emerging of the "social web" a growing number of papers and projects have argued, that the emergence of scientific reputation and influence happens elsewhere - and that it would be possible to use bibliometric tools to investigate those new ways, at least if they happen in the social web or focus on other publication formats like datasets, software or grey literature published in institutional repositories. This argument produced a new strand of research and (proprietary) products. (Figure 1, Strand 3)

Published in 2010, an influential "manifesto" of four researchers (Jason Priem, Dario Taraborelli, Paul Groth, Cameron Neylon) introduced the term "altmetrics" into this discussion:

> "These new forms [of metrics] reflect and transmit scholarly impact: that dog-eared (but uncited) article that used to live on a shelf now lives in Mendeley, CiteULike, or Zotero - where we can see and count it. That hallway conversation about a recent finding has moved to blogs and social networks - now, we can listen in. The local genomics dataset has moved to an online repository - now, we can track it. This diverse group of activities forms a composite trace of impact far richer than any available before. We call the elements of this trace altmetrics.
>
> Altmetrics expand our view of what impact looks like, but also of what's making the impact. This matters because expressions of scholarship are becoming more diverse. Articles are increasingly joined by:
>
> - The sharing of 'raw science' like datasets, code, and experimental designs
> - Semantic publishing or 'nanopublication,' where the citable unit is an argument or passage rather than entire article.
> - Widespread self-publishing via blogging, microblogging, and comments or annotations on existing work.
>
> Because altmetrics are themselves diverse, they're great for measuring impact in this diverse scholarly ecosystem. In fact, altmetrics will be essential to sift these new forms,

since they're outside the scope of traditional filters. This diversity can also help in measuring the aggregate impact of the research enterprise itself." (Priem, Taraborelli, Groth, & Neylon, 2010)

The call, send out by this manifesto, was answered by projects in funding agencies, contributions to the wider discussion on bibliometrics by researchers and science managers as well as several research projects. Since then the discussion has been enlarged to a point where different communities of libraries (academic, medical etc.) and publishers discuss the utilization of altmetrics to serve their clientele (Brigham, 2014; Khodiyar, Rowlett, & Lawrence, 2014; Popielarski, 2014).

Dinsmore, Allen, and Dolby (2014) report on projects by the British Wellcome Trust exploring the possibilities of alternative metrics. While those projects are in their early phase, the authors still estimate that "there is a great opportunity for all stakeholders in the research process to support efforts to better understand what these metrics tell us and how they might be used to the benefit of science." (Dinsmore et al., 2014, e1002003). Khodiyar et al. (2014) argue that altmetrics (e.g. counting the mentions of a paper on Twitter, Facebook and the like) holds the potential to show the usage of scientific papers as they happen, not after a longer time like citation analysis, which still relies on an extensive editorial process that happens before an article is published.

Hammarfelt (2014), in his synopsis of the knowledge on altmetrics, states not only the possibility of making the measurement of scientific work more just - in that it's closer to the reality of scientific work - by including more forms of communication into the analysis, but points to different traditions of usage of the social web or publication of non-traditional papers (grey literature, scientific papers in other languages than english etc.) in the humanities, which can be included into the assessment process by using altmetrics. Haustein et al. (2014) give evidence of the usage of altmetric tools and forms of communication per social media in different scientific disciplines. There is a huge uptake of such tools by researchers, but the form and quality seems to distinguish between different disciplines. Altmetrics seem not only to produce a more just picture of scientific communication, but a more complex one as well, as long as the use of such tools is focused on their different strengths. In accordance with such claims, Sud and Thelwall (2013) propose a reflected usage of altmetric tools.

Several surveys of altmetric tools have been compiled already. (E.g. Peters et al. (2014), with a lengthy list of such tools.) In their valuation of different forms of sources used for altmetric analysis Zahedi et al. (2014) highlight Mendeley, a reference manager, as most suitable for new forms of analysis. Reference manager allow the analysis of who is storing literature for reading, which is quite different from the analysis of who is citing which papers. Mohammadi et al.

(2015) already tested if those bookmarkings in Mendeley can be used as indication of readership and concluded, after a survey of scientists, that this is in fact reasonable. Mohammadi & Thelwall elaborate: "[...] evidence [...] suggests that Mendeley readership data could be used to help capture knowledge transfer across scientific disciplines, especially for people that read but do not author articles, as well as giving impact evidence at an earlier stage than it is possible with citation counts." (Mohammadi & Thelwall, 2014, p. 1627; also Nuredini & Peters, 2015) This shows the new dimensions that can be assessed by altmetrics.

Besides reference manager, nearly all other forms of communication and dissemination used by scientist are proposed as data basis for altmetrics (e.g. Thelwall and Kousha (2015) for ResearchGate, a social network for scientists, Zuccala, Guns, Cornacchia, and Bod (2015) for books) and different forms of visualization or measurement of scientific impact have been tested (e.g. Schiebel (2015) for a recent proposal for a visualization method).

As the consensus emerges that altmetrics indeed can produce a more complex picture of scientific communication, there is also a strand of research which tries to push the limits further than what can be examined with bibliometric or altmetric tools. Knoth and Herrmannova (2014) for example, argue that it is possible and in fact necessary to use full-text analysis and show the possibilities of such an approach on a small set of papers. Ding et al. (2013) argue for the usage of entities or "knowledge units" like chemical formulae - in their test from a list of XML-coded formulae - to draw networks of papers, that group itself around such entities without explicit citations.

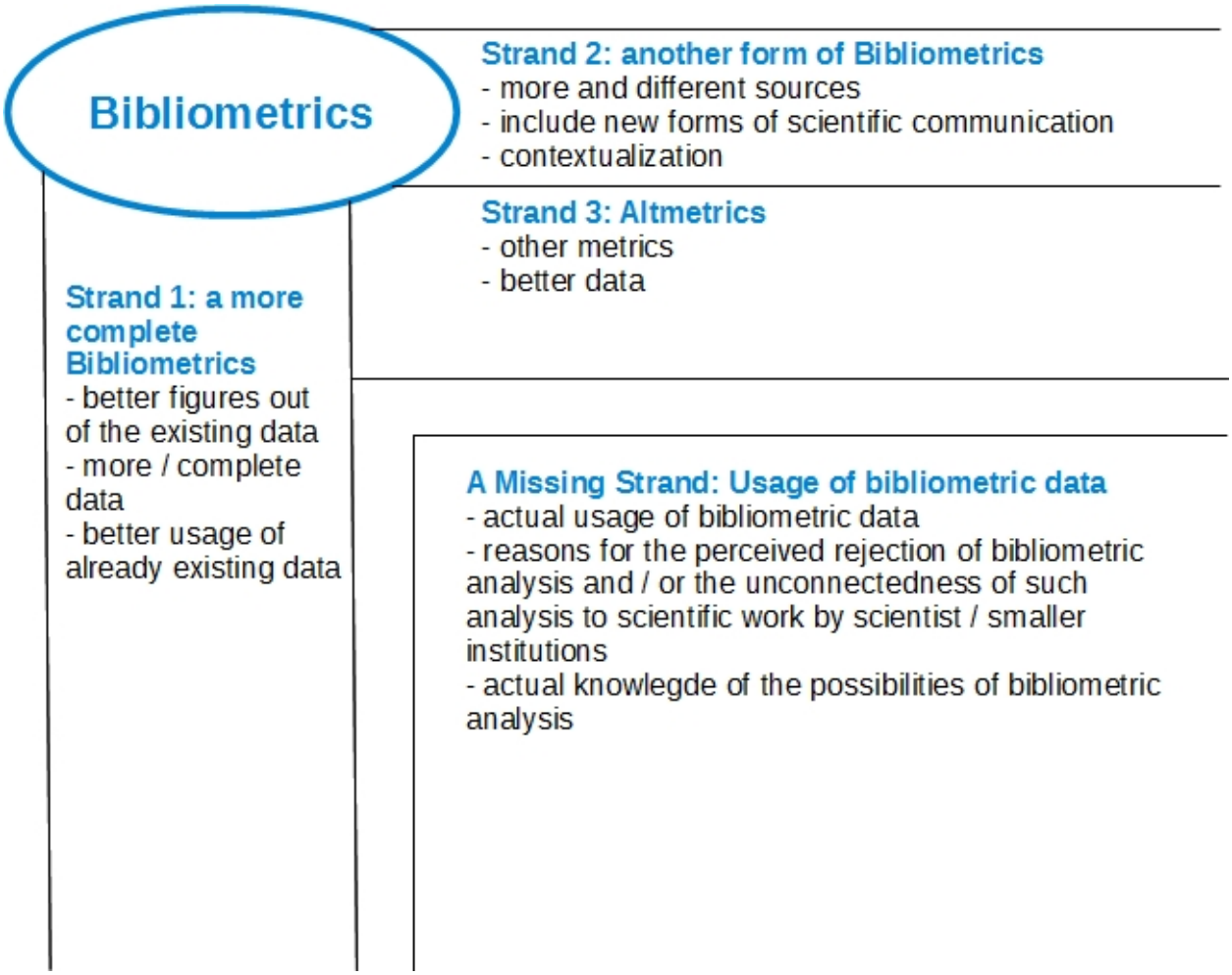

Figure 1: Strands of research on bibliometrics

2.4 Open Access and Bibliometrics

Several years ago participants in the discussions on open access and its effects on scholarly publishing began using bibliometric analysis. Moritz (2013) gives a comprehensive synopsis (in German) of such studies. E.g. in 2004 - more than ten years ago - Harnad and Brody (2004) already built on a pool of studies when they compared the citation count of open access and non-open access articles in the same journal. As is common in most of those studies they found a clear correlation between the open access/non-open access-status of articles and its dissemination as well as its citation rate. Although some, sometimes polemic studies - like Davis, Lewenstein, Simon, Booth, and Connolly (2008) - claim to show dissent results, it has now become wide shared knowledge, that the publication of articles in open access leads to more downloads, site views, citations and influence into the scientific discussion. However, this discussion is far from over, as different studies, using bibliometric and altmetric tools, tackle the question again and again and produce different figures for the "citation advantage of open access" for different fields (e.g. Frisch, Nathan, Shidham, and Ahmed (2014); Atchison and Bull (2015); McCabe

and Snyder (2014)). Although there are certainly other reasons to publish in open access, this ongoing discussion shows the possibilities and limits of bibliometric analysis. It also goes to show the importance of different forms of bibliometric tools and data.

It has been argued (Mohammadi & Thelwall, 2014; Hammarfelt, 2014) that the open access to data of different social web applications, like the aforementioned Mendeley, enables altmetric analysis, as those data sets can be used easily without restrictions enforced by commercial interests.

2.5 Bibliometrics as Service and Bibliometrics as Scientific Instrument

Bibliometrics and altmetrics can be used as a tool for the assessment of scientific communication and work as well as an instrument to investigate the networks of knowledge production. Those are two different forms of usage, not crossing each other out, but with different reputation. While the usage of bibliometrics as benchmark has become widespread and at the same time criticized, the usage of bibliometrics as research tool has assembled a great deal of scientific effort, but no great deal of impact.

Notwithstanding the widespread criticism, a number of commercial solutions have emerged, which offer forms of bibliometric and altmetric analysis, including a small number of institutions and consultants which use such tools and data to counsel academic institutions, funding agencies and those responsible for the governance of science. They include the Centre for Science and Technology Studies (CWTS) of Leiden, NL and Thomson-Reuters (with the Web of Science and the Impact Factor), both with the offer of specific studies, based on bibliometric data (e.g. for the Staatssekretariat für Bildung, Forschung und Innovation SBFI or the ETH-institutions) as well as the Altmetric Explorer by altmetric.com. Apparently there is a constant (and well funded) interest by big institutions to gather such data.

As opposition to the negative impacts of such usage of bibliometrics that has been perceived by a growing number of scientists and institutions (DORA Declaration on Research Assessment, 2012), some other metrics have emerged, most notably the PLOS-Altmetric Explorer and the INSPIRE-HEP Metrics by CERN. They prove the possibility of building other systems of metrics of scientific communication. Still, they are limited to specific publications or research fields. Up until now no solution has been produced that could substitute the commercial solutions, although the need for such a solution seems to exist.

The other form of usage of bibliometrics as a research tool to examine the networks of scientific knowledge or scientists has been undervalued in the governance of science. Although the possibilities for a better and more realistic governance are clear and often stated, the “magic of the sole number” like the Impact Factor - which seems to produce the impression of an objective value, although this is disproved many times - seems to work. Apparently it is essential to

promote other possibilities of bibliometric analysis, as they all imply a better understanding - not necessary a better benchmarking - of the inner workings of scientific communication and by that the chance of a more realistic governance of research infrastructure and funding of science. Freely and easily accessible systems for such analysis can be one part of such an effort.

2.6 Information extraction and named entity linking

One approach toward obtaining information on publication behavior is collecting bibliographic data from heterogeneous sources such as institutional repositories, academic social media, and Web pages. Information extraction allows such approaches to (a) extract bibliographic entries from these structured and unstructured resources, and to (b) identify named entities such as authors, journal names and conference titles in these entries. Named entity linking - which is also known as named entity resolution - is, therefore, considered a key technology for automatic content acquisition process, since it allows automatically identifying authors and publication outlets such as journals, conferences, and editors in bibliographies. This section provides a short summary of the current state of the art in named entity linking and on the use of background knowledge for information extraction.

Named entity linking

Gangemi (2013) gives an overview of information extraction tools including specific applications for named entity recognition and linking. Wang, Chakrabarti, Cheng, and Chaudhuri (2012) approach the disambiguation problem by suggesting a graph-based model (MentionRank), which leverages the principle that homogeneous groups of entities often occur in similar documents. When applied to information technology companies, for instance, context-awareness helps to disambiguate terms such as "Apple" or "HP" when they occur in documents with an information technology or business focus.

Many approaches either use Wikipedia for training their models (Kataria, Kumar, Rastogi, Sen, & Sengamedu, 2011; Nothman, Ringland, Radford, Murphy & Curran, 2013) or use background knowledge from Wikipedia to improve the accuracy of the named entity disambiguation process (Han & Zhao, 2009; Pilz & Paaß, 2011; Hoffart et al., 2011). Han and Zhao (2009) observe that leveraging semantic knowledge from Wikipedia yields an improvement of 10.7% over traditional bag-of-word approaches, and a 16.7% improvement over traditional social network-based disambiguation methods.

Pilz and Paaß (2011) use a thematic information measure derived from Latent Dirichlet Allocation (LDA) to compare mentions with candidate entities in Wikipedia. Distance metrics in a supervised classification setting enable them to identify the best fitting entity for that particular

mention. Kataria et al. (2011) use a hierarchical variant of LDA models for named entity disambiguation. They present a semi-supervised hierarchical model that considers Wikipedia to learn name-entity associations, exploits Wikipedia annotations, and uses Wikipedia's category hierarchy for capturing co-occurrence probabilities among entities.

Recently, Nothman et al. (2013) used Wikipedia to create multilingual training data for named entity linking tasks, resulting in millions of annotations in nine languages. An evaluation of their Wikipedia-trained models based on English, German, Spanish, Dutch and Russian reference data from the Conference on Natural Language Learning (CONLL) shared task (Tjong Kim Sang, Erik F., 2002; Tjong Kim Sang, Erik F. & Meulder, 2003) shows that they outperform a number of other approaches to automatic named entity linking.

Fernández, Arias Fisteus, Sánchez, and López (2012) present IdentityRank, a supervised algorithm for disambiguating names in news coverage. The authors process historical co-occurrence information on entities and topics, and temporal information on entities prevalent in news streams for estimating the probability of a name to refer to a certain entity. Jung (2012) explores how named entity linking methods can be applied to challenging data sets such as those derived from social media streams, which are characterized by short and often noisy text.

DBpedia Spotlight (Daiber, Jakob, Hokamp, & Mendes, 2013) is another named entity linking system which uses DBpedia to annotate entities in text documents, but lacks advanced preprocessing and is currently limited to DBpedia only. Finally, AIDA (Hoffart et al., 2011) is a well-known system for named entity linking which harnesses context information from structured data sources such as DBpedia and YAGO, and introduces a new form of coherence graph that combines the prior probability of an entity being mentioned with context similarity and the coherence among candidate entities for all names referenced in a document. AIDA even supports entities which are not yet covered in the knowledge base (called unlinkable entities, emerging entities or out-of-knowledge-base entities) by introducing an additional unlinkable entity for each mention and computing characteristic phrases for the unlinkable entity prior to disambiguation (Hoffart, Altun, & Weikum, 2014).

Weichselbraun, Streiff, and Scharl (2015) present Recognyze, a named entity linking component that uses background knowledge from arbitrary linked data sources to disambiguate and link named entities. In contrast to other methods that only provide basic means to manipulate the data acquired from external knowledge sources, Recognyze offers an advanced infrastructure for validating and enriching these data. Its pre-processing pipeline allows extracting and manipulating names, context information, structural information and an entity's relative importance from the knowledge sources under consideration.

Background knowledge for information extraction

Hoffart et al. (2011) and Weichselbraun, Gindl, and Scharl; Weichselbraun, Gindl, and Scharl (2013; 2014) demonstrate that considering external knowledge for information extraction tasks such as named entity linking can significantly improve the accuracy of the deployed methods.

The field of Natural Language Processing (NLP) has a long history of dealing with the subtleties of human languages. NLP researchers have created comprehensive structured resources that represent common sense knowledge and contain information on ambiguous concepts and potential sentiment indicators. Examples of such resources include ConceptNet (conceptnet5.media.mit.edu), SenticNet (sentic.net) and SentiWordNet (sentiwordnet.isti.cnr.it).

Machine learning approaches that limit the use of background knowledge to the training set have also been successful. Wu and Weld (2010) use Wikipedia infobox attributes extracted from a cleaned set of infoboxes provided by DBpedia to generate training examples for their information extraction component. They report an improvement of the F-measure of between 18% and 34% when compared to a similar approach that solely relied on hand crafted heuristics for generating training data.

3 Methodology

SYMPHONY Requirement Analysis combines a stakeholder dialogue which considers relevant stakeholders such as scientists, the State Secretary for Education, Research and Innovation, the Swiss Academies of Arts and Sciences and the Swiss Science and Innovation Council with a classical technical requirement analysis to further align the project's technical and societal goals with the needs of these stakeholders.

The Stakeholder Dialogue has included two methodological elements:

1. Interviews among experts and stakeholders in the Swiss science system
2. Workshop with the interviewed stakeholders

First, quantitative and qualitative data will be collected through interviews among relevant stakeholders in Switzerland. These interviews will provide additional information not only on the publication behavior itself but also on the underlying motives and attitudes of the stakeholders.

Second, qualitative data will be gathered by means of a workshops with the interviewed stakeholders.

3.1 Interviews

The interviews served to gather quantitative data through closed questions and qualitative data through open questions among stakeholders such representatives of all universities and most universities of applied sciences, research organizations, funding agencies, bibliometric experts etc. The choice of the experts to interview depends of their position. We looked for people in decision-making positions starting from research managers if possible, otherwise persons responsible for open access. These interviews have provided additional information not only on the publication behavior itself but also on the underlying motives and attitudes of the researchers. In order to coordinate the interviews the research group has grouped the stakeholders into three different rings. Figure 2 shows the stakeholder groups and the order of the interviews, starting from the middle of the circle. Figure 2 is a symbolic graphic and in this regard the size of the circles does not correspond to the number of interviewed stakeholders.

Figure 2: Stakeholder groups

The first ring, starting from inside the circle, comprehends the Research Policy (SERI, SNSF, CTI, swissuniversities), the second ring includes the researchers and their organizations (Academies of Sciences, CERN, ETH Domain, universities selection, colleges selection) and the third ring groups other important stakeholders (EuroResearch, research foundations, researchers, hospitals, foreign experts).

The circles are designed so that the outward interviews each have a time lead from the inside:

1. Circle: Research Policy (SERI, SNSF, CTI, swissuniversities)
2. Circle: Researchers and their organizations (Academies of Sciences, CERN, ETH Domain, universities selection, universities of Applied Sciences)
3. Circle: Further important stakeholders (EuroResearch, research foundations, researchers, hospitals, foreign experts)

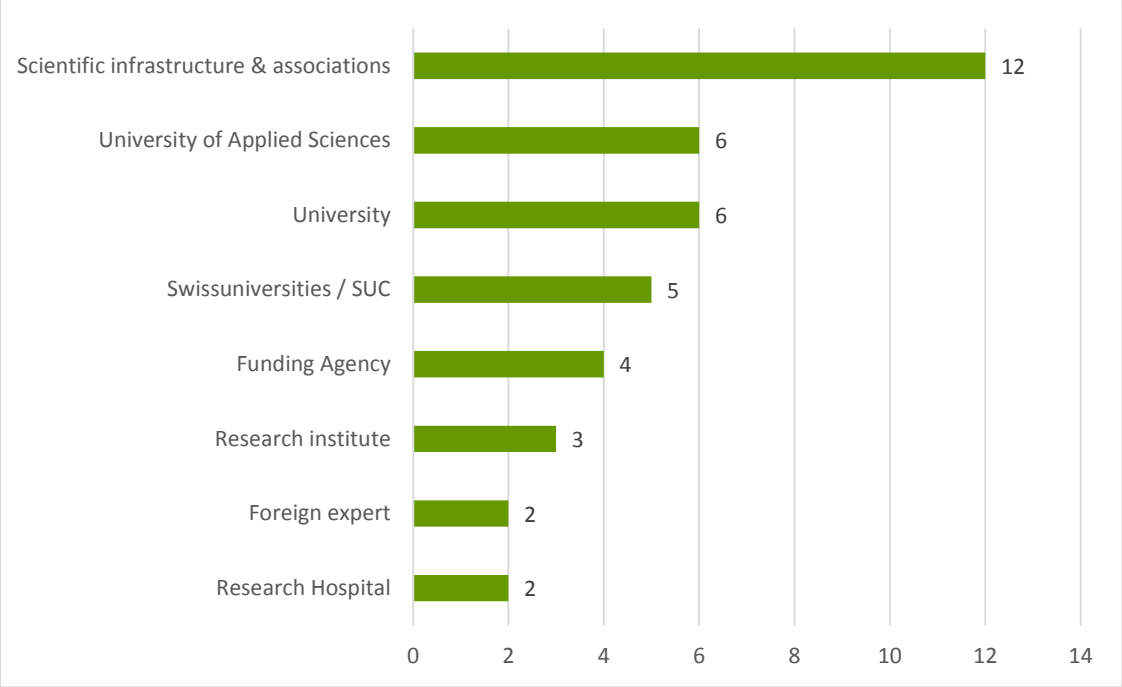

Figure 3: Stakeholder grouped by organisation type
(absolute numbers; N=40 expert interviews)

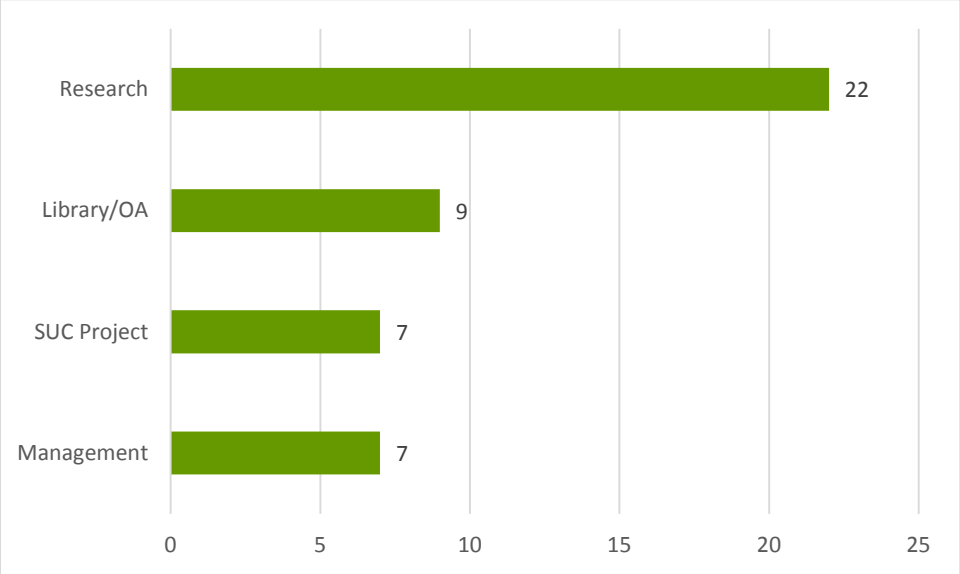

Figure 4: Activities of the interview partners
(absolute numbers; N=45 persons participating in 40 interviews; 5 two-person interviews)

The research group has asked 54 experts representing 54 stakeholder organization for an interview and received a positive answer from 40 of them that corresponds to a high response rate of 74%. Five organizations have decided to participate in the interview with two experts, therefore the total number of interviewed experts is higher (45) than the number of interviewed

organizations (40). In the following analysis, we will work with the number of interviewed organizations, because the experts in the two-persons-interviews did not stress their individual differences, but developed a common answer.

The interviews have been distributed among the members of the group, so that each member of the team has interviewed at least two experts depending on the linguistic proficiency. The interview languages were German, French and Italian. The German and Italian interviews have been conducted by members of the research team at the HTW Chur, the French interviews by a master student with French as mother tongue. The interviews were conducted between April and June 2015 at the experts' workplace. Interviews with experts from abroad were done by phone.

The interviews have been conducted at the workplace of the partners and in their native language. Figure 5 shows the number of interviews conducted per language.

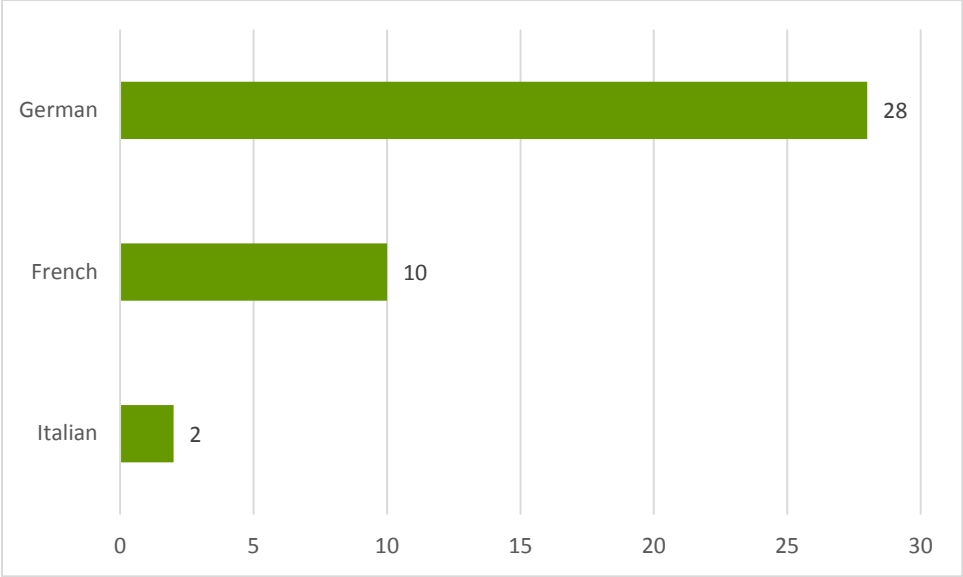

Figure 5: Number of interviews conducted per language
(absolute numbers; N=40 expert interviews)

Through the expert interview, we wanted to benefit from the knowledge and expertise of the experts. For the interviews, an interview guide has been prepared and translated into the other two interview languages French and Italian. The interview guide is intended to cover the most important aspects of these requirements analysis.

At the beginning of the interview, the experts were asked about their relation (according to their professional function) on the subject (see Figure 4). In the main part of the survey the questions were grouped into different categories: 1) Custom Practices Regarding the measurement of

output of scientists, 2) bibliometrics and Altmetrics, 3) requirements for a new system and 4) statements considering a possible new system.

In the last section of the survey (statements considering a possible new system), stakeholders were asked to state if they agree or disagree to five statements about a possible new system of measurement of the performance of scientists.

With the agreement of the expert, the interview has been tape-recorded. All data were evaluated strictly confidential and only in anonymous form. We have used direct quotes extracted from the interviews, but all information and data allowing conclusions to specific persons or organizations have been removed.

3.2 Workshop

Qualitative data has been gathered by means of a workshop with the stakeholders mentioned. This workshop had the intent to yield insights on systematic differences between scientific disciplines with regard to the publication behavior.

3.2.1 Preparation of the workshop

During the interviews the experts were asked to participate at the workshop and four possible workshop dates in June were proposed. Finally, Friday, 12th of June, 2015 got the larger agreement. All interview participants were informed again via e-mail about the workshop date. 13 interviewed experts agreed to participate.

3.2.2 Aim of the workshop

The aim of the workshop was to involve the interviewed experts in a joint discussion where (1) the first results from the interviews and (2) the consequent developed scenarios are presented and discussed. The opinion of the experts on individual topics was issued already in the interviews and the workshop can provide a common deepening on the further ongoing in this field. The experts can share their opinions and be introduced into the discussion. To evaluate an overview of the preferences and expectations of the HTW-Team, the experts were asked to evaluate the scenarios in a positive as well as a negative way. Therefore, for the discussion of the four different scenarios, experts were invited to evaluate the scenarios and evaluate the possibilities and implementation of a new system.

4 Results

4.1 Interview Results

The analysis of the interviews was carried out utilizing two different methods according to the type of gathered data.

On the one hand the conducted survey yielded quantitative data due to closed questions asked during the interviews. This data was analyzed by counting the occurrences of the different options selected by the interviewees. As well as the occurrences of the different options selected we also counted the occurrences of cases in which no answer was provided. In these cases the interviewer was not able to get an answer from the interview partner or the interview partner decided not to answer the question. Additional statements by the interview partner were also recorded. This data was used to help interpret the results.

On the other hand the interviews yielded qualitative data due to the open nature of the question. The interviewee could answer the questions freely without any restrictions. In order to analyze this corpus, the summarizing content analysis method referring to Mayring (2010) was utilized. For this method the corpus per question was first viewed to get a general idea of the content of the corpus. In a second step recurring ideas were paraphrased to create a summary of these ideas. In a third step these paraphrases were abstracted once more in order to group similar ideas. These abstractions were then counted in order to visualize the content of the answers given to each analyzed question. This method was chosen to obtain an overview of the given answers and filter out single ideas that may be interesting but do not reflect the general consent. A general consent was defined as two or more interview partners expressing the same idea. An interview partner could express more than one or no recurring idea.

A request made during the workshop - to differentiate the results by the type of institution - was not accepted. This decision was made since the goal of the interviews was not to identify proponents and opponents of certain practices or the view of specific groups on these practices but rather gain an insight into the advantages and disadvantages regarding the measurement of scientific performance in Switzerland today.

4.1.1 Reasons for Measurement and Usage

The reasons for measurement and the usage of the measured data is comprised of two questions. The reason for the measurement of publication performance was analyzed using the qualitative method. The usage of the acquired data was analyzed using the quantitative method.

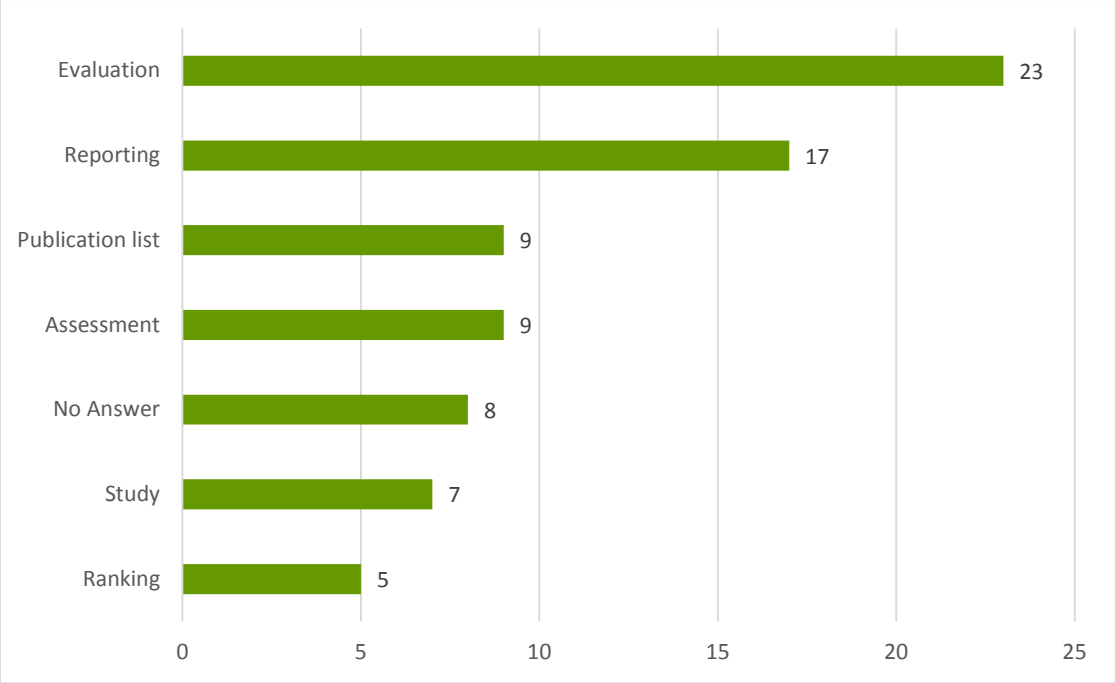

Figure 6: Reasons for measurement of scientific performance
(absolute numbers; N=40 expert interviews; multiple answers per interview possible)

Figure 6 shows the results of the analysis of the data. Following recurring ideas were identified:

1. Evaluation: Evaluation is the idea that the data is used to measure how effective certain activities were in relationship to similar activities.
2. Reporting: Reporting means, that the organization or sub-organization is required to collect the data to report to some instance.
3. Publication list: This idea represents the usage of the data in order to generate a publication list for the organization or sub-organization.
4. Assessment: Represents the idea of measuring what was achieved in a certain time period.
5. No Answer: In these cases the interview partner chose not to answer the question.
6. Study: This idea represents the process of analyzing the data in order to gain new knowledge without necessarily deriving any actions from the obtained results.
7. Ranking: Ranking is used to create a judgmental comparison between two parties. These may be single persons or groups like sub-organizations or organizations.

It must be remarked that the ideas evaluation, reporting and assessment can have certain intersections depending on the content. These can be fuzzy terms and they were extracted using the terms that the interview partners used.

As seen, evaluation and reporting where the top chosen reasons that the interview partner communicated. There seems to be some need to measure the effectiveness of certain activities or entities. These measurements result also to be required by some instances that oversee these

entities, may they be organizations, sub-organization or persons. The need for a publication list might be interpreted similarly when used to report to someone but doesn't imply any actions based on the results. Assessing the achievements is mentioned the same amount of times as the idea of generating publication lists though it doesn't mean that the method of how these achievements were made have to be the center of the measurement.

In a few cases the interview partner mentioned the usage of the data for scientific reasons, just to study the situation in order to generate new knowledge. And at last some interviewees agreed, that the data was used to judge the relationship between two entities whereas this judgment might result in some gain for an entity depending on the results. An example in this regard is when promoting employees or advertising the ranking position of the organization in order to acquire additional funding.

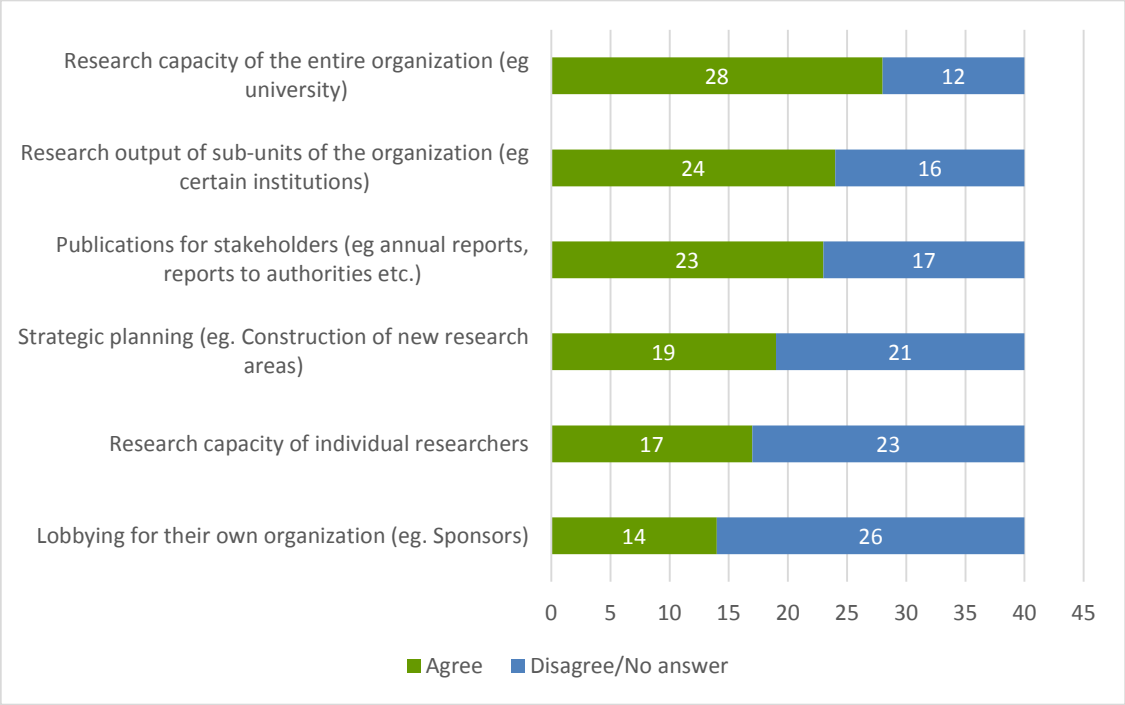

Figure 7: Reasons for the usage of data
(absolute numbers; N=40 expert interviews)

The results of the data usage visible in illustration 7 show how often the interviewees agreed with the provided options in relationship to how often they disagreed. As can be seen, the need to analyze the research capacity of the whole organization or its sub-units is high. In combination with the reasons for measuring the scientific performance as seen in illustration 6 it can be concluded that the analysis of the organization or its sub-units is used for evaluation. More than half of the interview partners agreed that the data was used for publications for stakeholders. As these often include publication lists it coincides with illustration 6 were the creation of publication lists is on rank three. A bit less than half of the interviewees said that strategic

decisions were made based on this data. It was mentioned that the data is not suitable for these decisions since there are many other factors, e.g. education, to be considered and to avoid premature conclusions. Only some admitted to using the data to analyze the research capacities of individual researchers. In those cases the interview partners asserted that the data was only one part of the evaluation process of the individual researcher and that this was mostly done only in specific situations. Lobbying didn't seem to be important to most interview partners. Only one third mentioned that the data was used for lobbying purposes.

4.1.2 Indicators used

The question about which indicators are used to measure the output of scientists revealed that the number of publications in peer reviewed publications seems to be the most important one. Following are indicators with financial or public character. Not only are indicators used that disclose how much money the research is generating, but also what resonance the research might have with the public in form of publicity or cooperation. The mid-table comprises of further publication forms not associated with impact factors or peer review. It must be noted, however, that more than half of the interview partners agreed to the impact factor being an indicator that is used. Only a bit more than one third of the interviewees mentioned that Open Access publications were used as indicator and the fewest agreed upon altmetrics indicators like mentions on social media or research blogs being a used indicator.

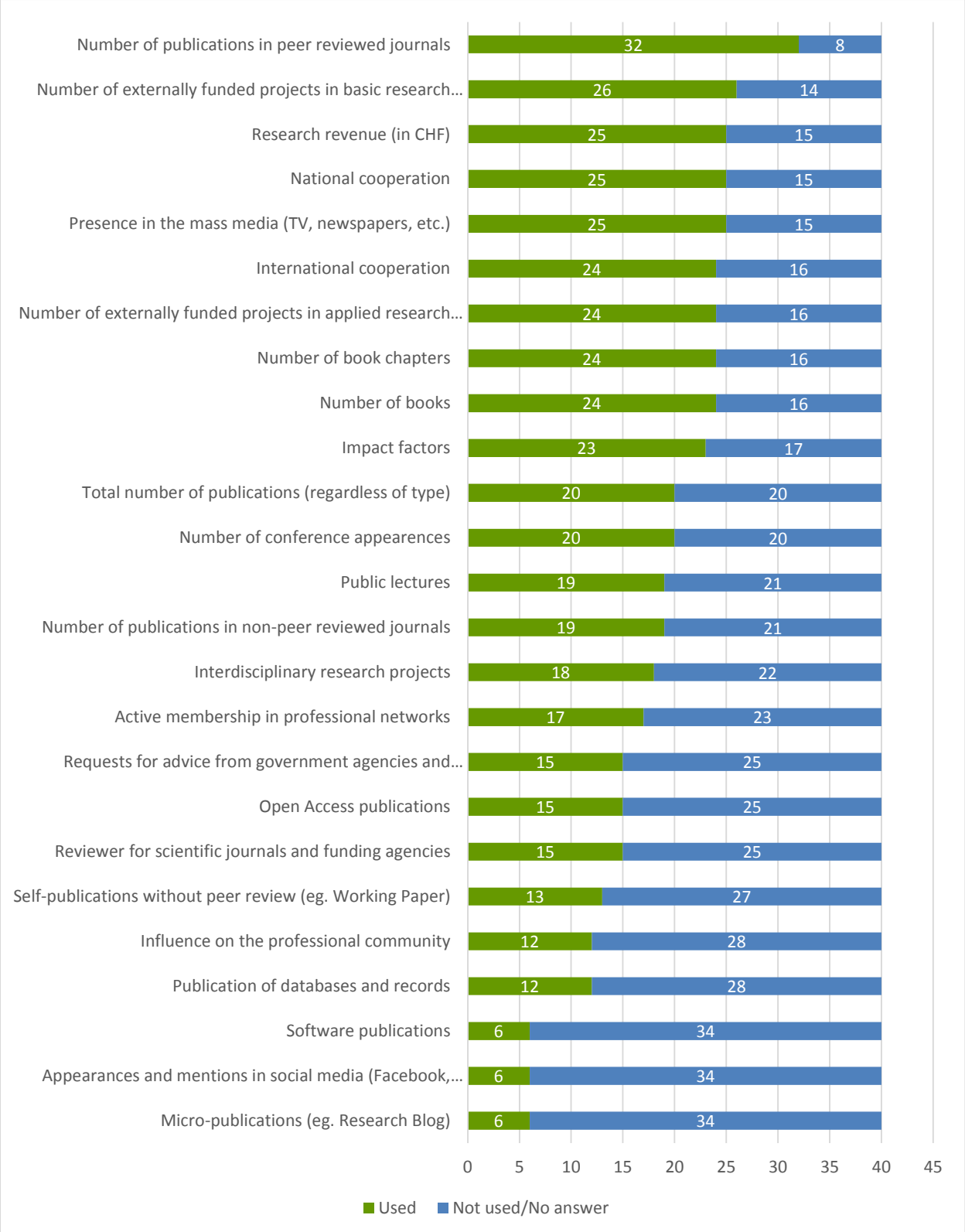

Figure 8: Indicators used to measure the output of scientists
(absolute numbers; N=40 expert interviews)

4.1.3 Challenges of measuring scientific performance by means of publication analysis

When asked about the challenges of measuring scientific performance by means of publication analysis there were a wide variety of responses. The analysis of the data revealed following recurring ideas:

1. Lack of differentiation between research fields: As the biggest problem a lack of differentiating different research fields for measurement was mentioned. Most agreed that different fields of research obey different rules and have different priorities. These differences are not met when measuring the scientific performance by analyzing publications, e.g. in some fields journal articles are primary published and in others books are more important.
2. Quantity does not equal quality: Many criticized that publication analysis would favor quantity of publications in order to generate an indicator, but ignore the quality of the published content. They feel that quantitative indicators cannot describe the quality of the content analyzed.
3. Interpretation problem: A third of the interviewees agreed that currently the indicators used lead to interpretation problems. This can be due to lack of knowledge of the indicators or to simplified indicators being interpreted out of context.
4. Too few types of publications: In conjunction with the lack of differentiation of the research fields it was mentioned that there are not enough types of publications being considered. For example a music or art scholar would present his work in a concert or an exhibition. They also could publish their work in form of audio files or pictures and videos.
5. Incomplete data: It was mentioned a few times that the data used to analyze research performance by means of publication analysis was often incomplete and thus warps the results. Not all publications are always considered and also not all citations are always found. They mostly agree that the collection of all this data was very tiresome.
6. Promotes "Publish or Perish": It was mentioned a few times that the current system would also promote the idea of “Publish or Perish”. This would lead to false incentives and also promote misbehavior, harming not only the researcher but also the system.
7. Impact factor is a problem: As example for misinterpretation of indicators the impact factor was also mentioned. The biggest problem seems to be that researchers and also stakeholders interpret the journal impact factor as indicator of the value of a publication and of the author, although the journal impact factor is only meant to compare journals among each other.
8. Publications are not only form of performance: In addition to the idea that there are too few types of publications, it was also mentioned that publications are not the only form of evaluation of the research performance since there are many other areas that also have to be considered. For example the teaching activity of researchers or even administrative duties must also be regarded as valuable output. These are duties that also have to be recognized and also hinder the researcher from publishing.

9. No comparability: A lack of differentiation results in a lack of comparability. Not only is the comparability of different research fields by means of publication analysis questioned, but also the comparability of different organization type like universities and universities of applied sciences that pursue different goals in terms of research output. Current indicators would not allow a fair comparison of these parties.
10. No measurements of social impacts: The lack of measuring the social impact of the research conducted was also mentioned. A few interviewees felt that publication analysis did not reflect this aspect enough or at all since often the research done was not suitable for publishing, but has nevertheless an impact on society.
11. Citation analysis does not always indicate quality: The approach of analyzing research performance based on citation analysis was also criticized. It was argued that this wasn't a reliable indicator since publication of low quality can be cited very often because of the fact that they are of low quality and convey false or disagreeable ideas. Citation analysis was also deemed to be susceptible to trends and current events that would result in a rise of citations or number of mentions.
12. Language barriers: In many research fields it is not common to publish in English, but in the respective research language. These publications are confronted with a language bias in terms of citation and publication analysis.
13. No weighting: As last, two interview partners criticized the lack of weighing options by users wanting to specify the value of different types of publications and indicators. This wouldn't allow them to adjust certain aspects of the respective research fields in order to allow a fair comparison or evaluation of the research performance.

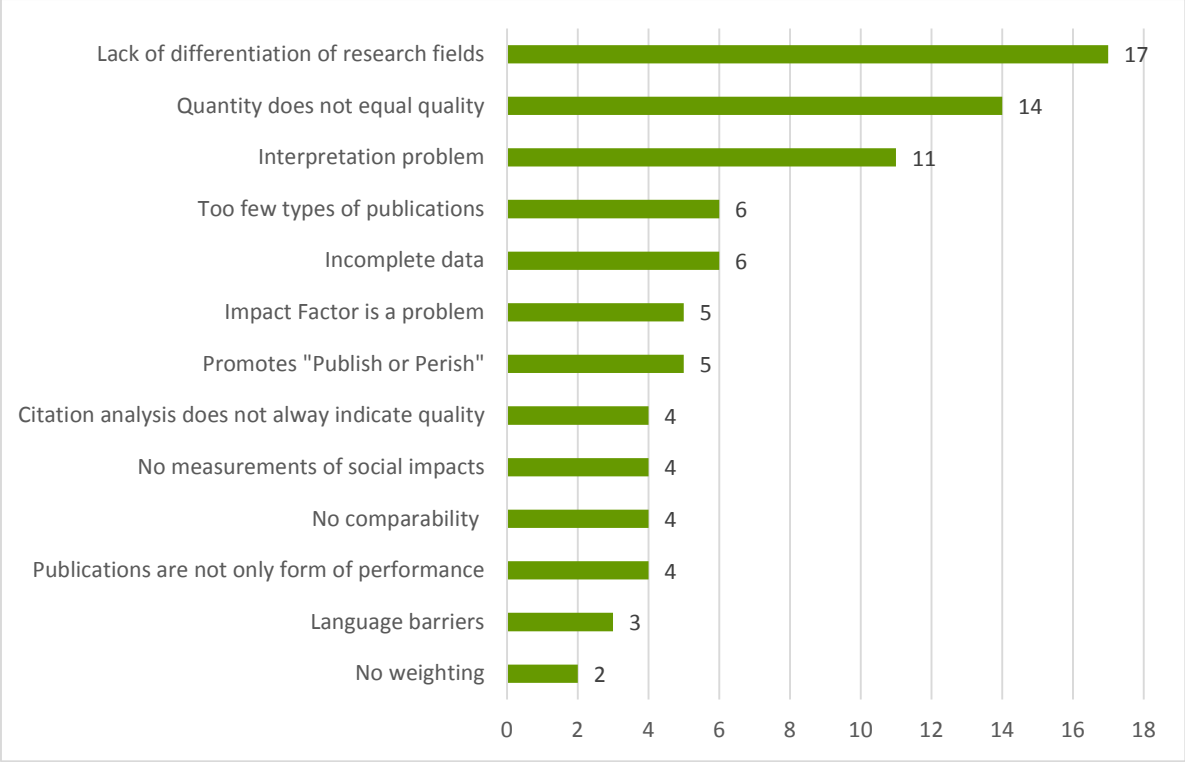

Figure 9: Challenges of performance measurement by publications
(absolute numbers; N=40 expert interviews; multiple answers per interview possible)

4.1.4 Open Access Barriers

The question about existing Open Access barriers showed an interesting picture. The results indicate that in general there does not seem to be big barriers preventing the researchers from publishing their work as Open Access.

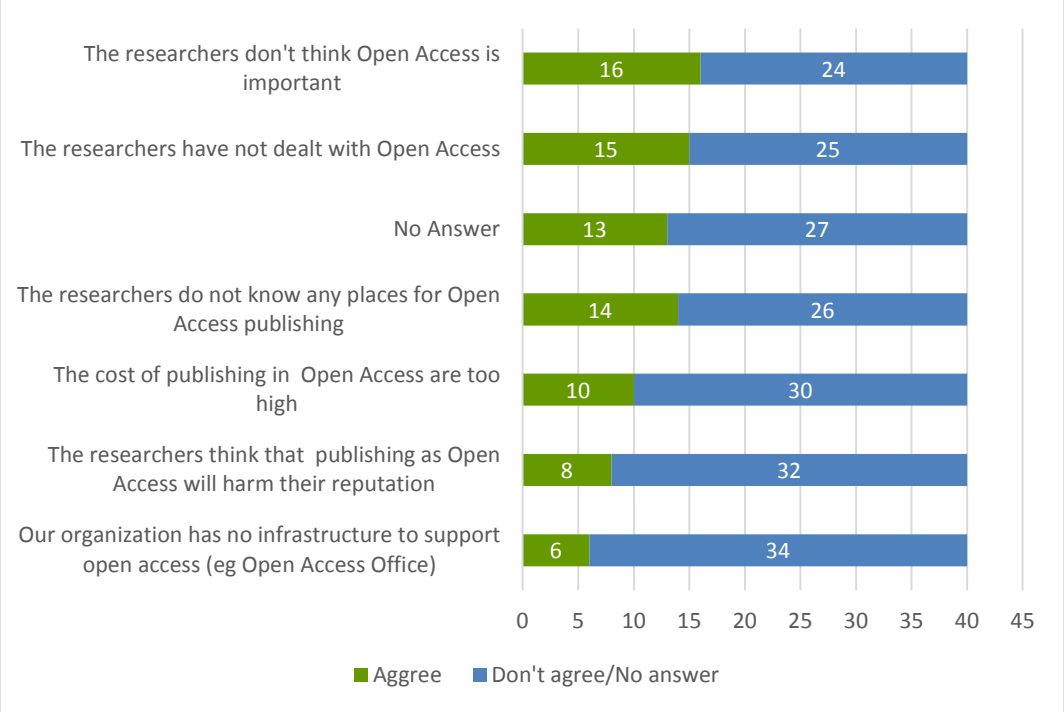

Figure 10: Open Access barriers
(absolute numbers; N=40 expert interviews)

But among the reasons against Open Access those that can be characterized as cultural barriers seem to be dominant. Suchlike a diminished recognition of the importance of Open Access, a reluctance to deal with the subject or lack of knowledge of suitable publication platforms. These reasons seem to indicate that the advantages of Open Access are not fully visible yet to those that do not publish as Open Access and can be changed utilizing specific methods to visualize the state and status of Open Access. More concrete reasons against Open Access such as the cost, loss of reputation or lack of support, although present, do not seem to dominate.

It was mentioned though that the disadvantages of publishing as Open Access might not be the problem, but the advantages of not doing so. Researchers often chose their publication type in order to advance their reputation. If confronted with the decision to publish as Open Access or gain reputation by publishing in a high impact journal without Open Access the researcher chose the latter.

4.1.5 Publication pressure

To the question if there is a pressure to publish among the scientists most interview partners agreed that there is a high pressure. This was often commented with the idea of "publish or perish" and that the researchers do suffer from this. It was also mentioned though that this pressure was generated among the researchers in their respected communities.

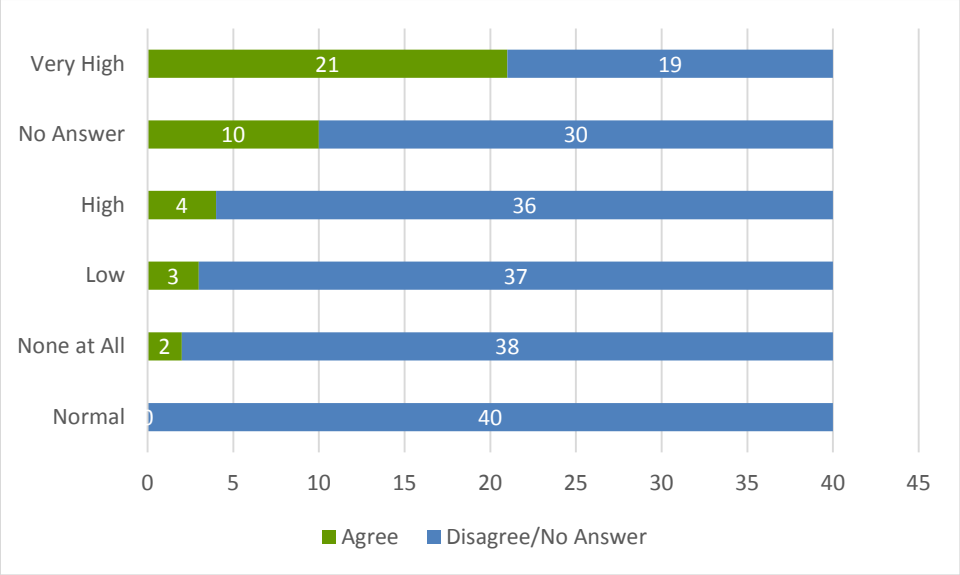

Figure 11: Publication pressure
(absolute numbers; N=40 expert interviews)

The results to the question if the pressure to publish will increase, decrease or stay the same seem to confirm the hypothesis made concerning the state of Open Access. Although the majority chose not to answer the question those who did mostly agreed that the pressure will increase. This is due to the fact that competition is growing and funding agencies rely on the reputation acquired by publishing in high impact factor journals to distribute funding. It was also mentioned that quantitative measurement methods seem to be increasing due to the whole idea of data analysis or big data.

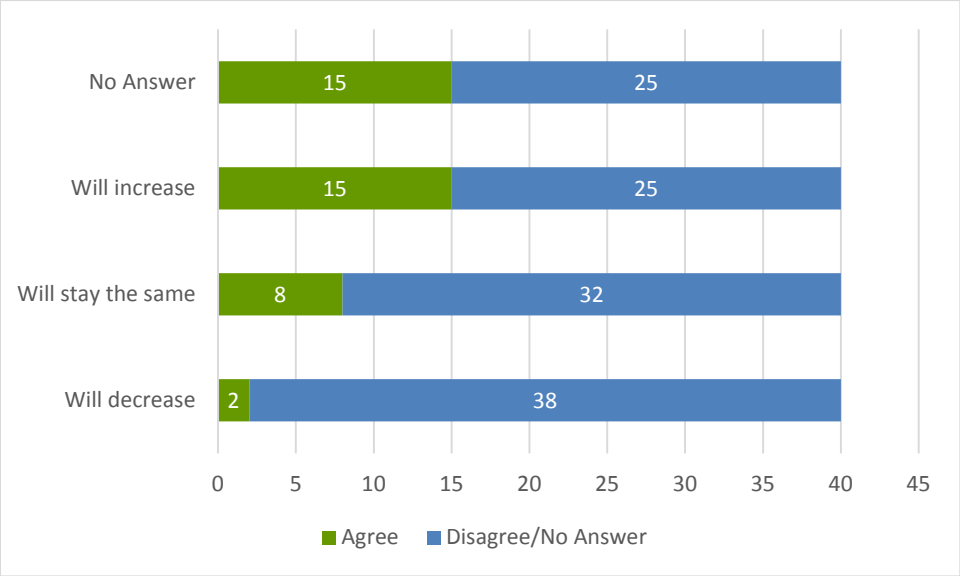

Figure 12: Increase of the publication pressure
(absolute numbers; N=40 expert interviews)

Among those that thought that the pressure will stay the same there were some that also mentioned that the current state is good and provides some needed competition.

Those that thought that the pressure will decrease mentioned DORA and that this might lead away from the current situation.

Many also mentioned that there is a increasing resistance against the mentality of publish or perish. These mentions were made by interview partners that either agreed that the pressure will increase or stay the same. It was also mentioned that the impact on society should increase and that reputation among peers shouldn't be the only factor driving the publication pressure.

4.1.6 Bibliometrics and Altmetrics

The following questions concern the knowledge and state regarding bibliometrics and altmetrics.

The majority of the interview partners knew about bibliometrics. To the question if bibliometrics is a topic among the researcher nearly half answered that bibliometrics is used in their organization. Many added that bibliometrics is being scrutinized even if not in use. In some cases bibliometrics is being discussed either because there are plans to start using it or because the significance of the values is not clear or is questioned.

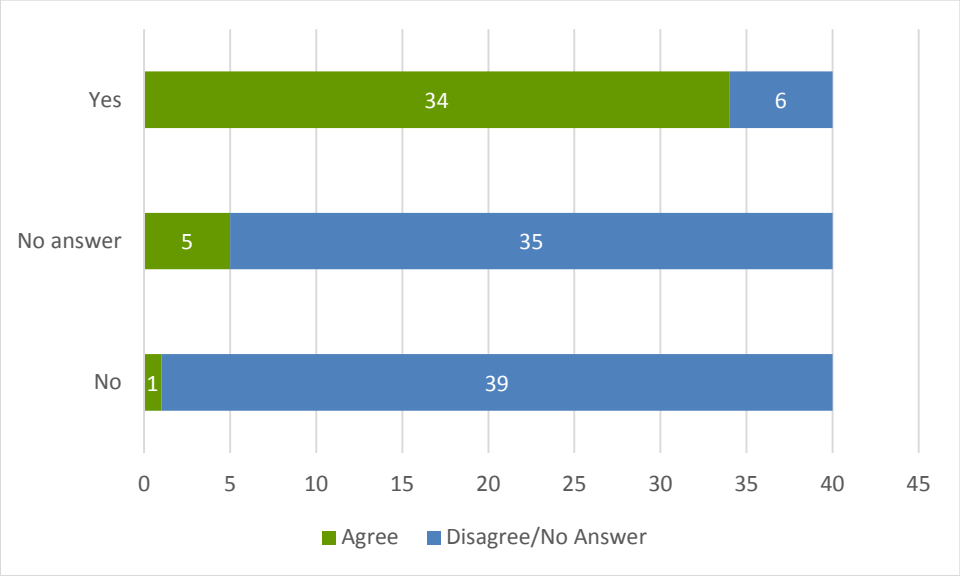

Figure 13: Knowledge about bibliometrics
(absolute numbers; N=40 expert interviews)

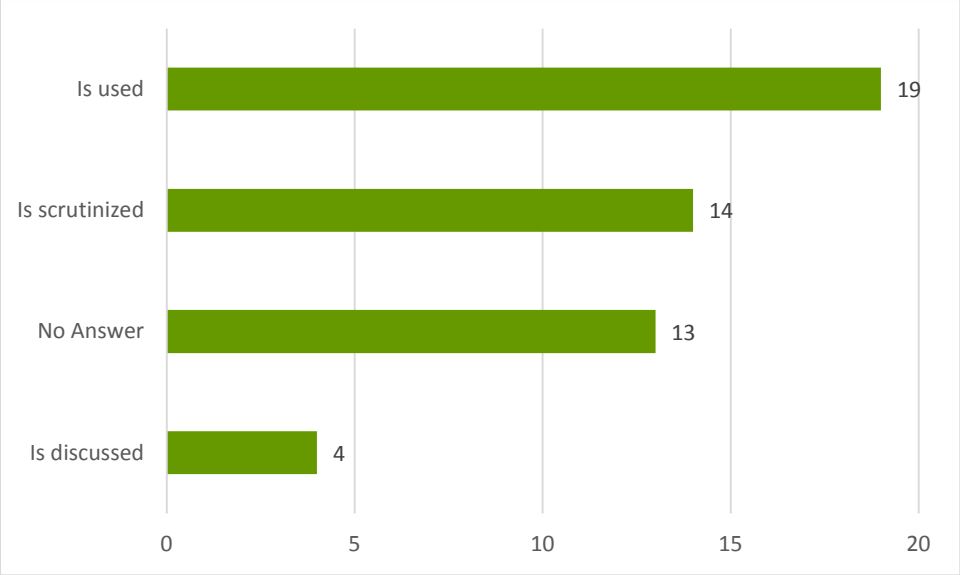

Figure 14: State of bibliometrics
(absolute numbers; N=40 expert interviews; multiple answers per interview possible)

To the question what the bibliometric data is used for the biggest majority agreed that it is used to measure and compare scientific achievements. A majority also agreed that it is used (or can be used) to analyze the influence networks of researchers. Less than half thought it can be used to investigate the development of science.

It must be noted that many interview partners did not answer the question according to what is being done at their organization, but according to the potential application of bibliometric data.

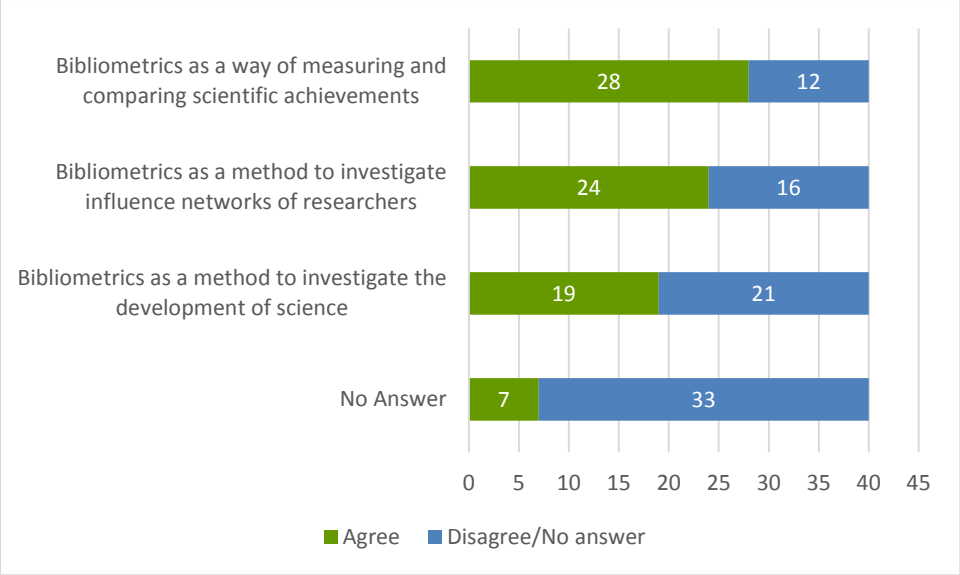

Figure 15: Usage of bibliometrics
(absolute numbers; N=40 expert interviews)

When asked about altmetrics only a bit more than half of the interviewees have heard about altmetrics. Nearly a third did not know about altmetrics.

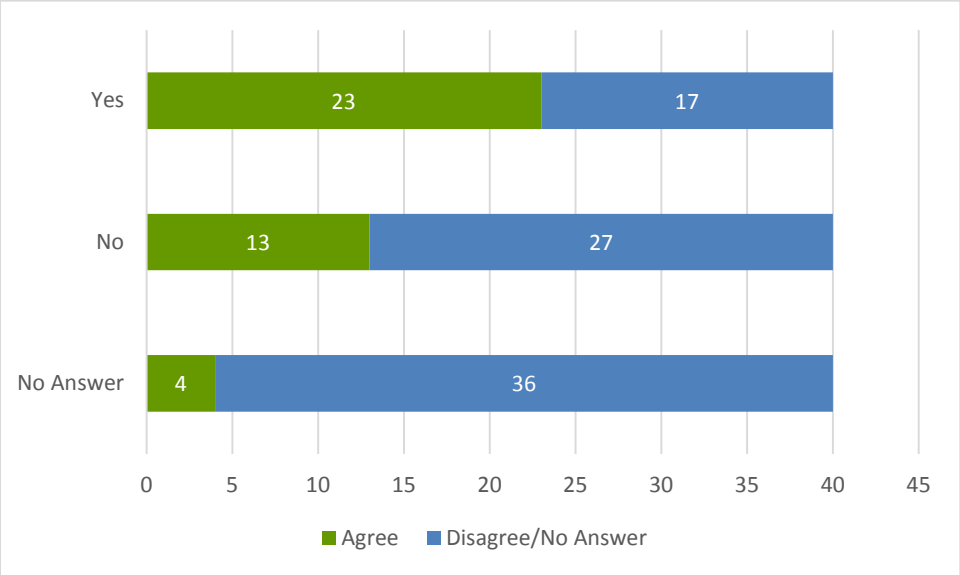

Figure 16: Knowledge about altmetrics
(absolute numbers; N=40 expert interviews)

When asked to define altmetrics most answered that they thought it has something to do with social media. They mentioned twitter and research gate to explain their reasoning. A few defined it as analyzing grey literature and even less thought it had to do with gathering data on open access journals not present in Web of Science.

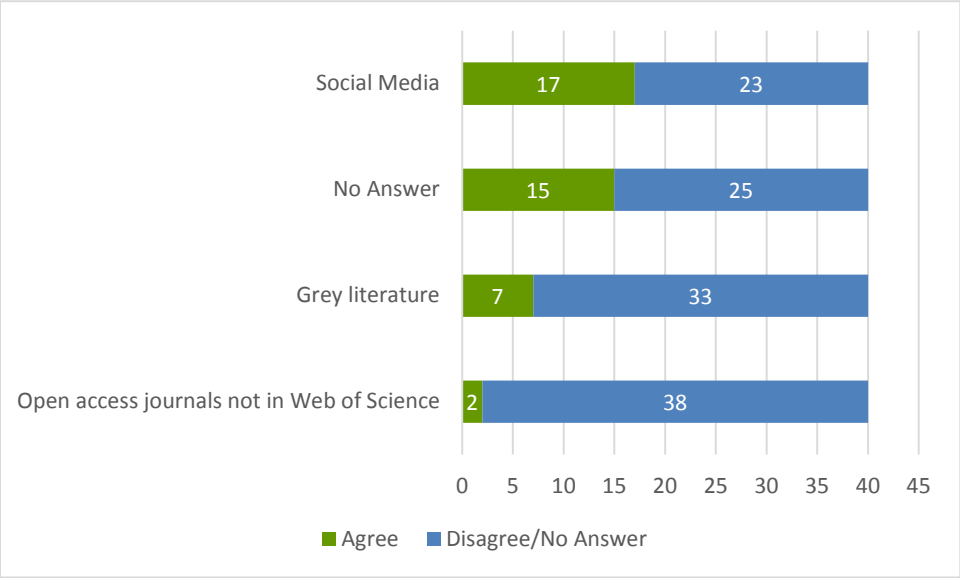

Figure 17: Definition of altmetrics
(absolute numbers; N=40 expert interviews)

When asked if altmetrics is a topic in their organization about a third of the interview partners agreed. A bit more than a quarter mentioned that altmetrics was not used at their organization. A few mentioned that there was an opposition present towards altmetrics. In these cases the value and significance of altmetrics was often questioned. Only two interview partners stated that altmetrics is being used.

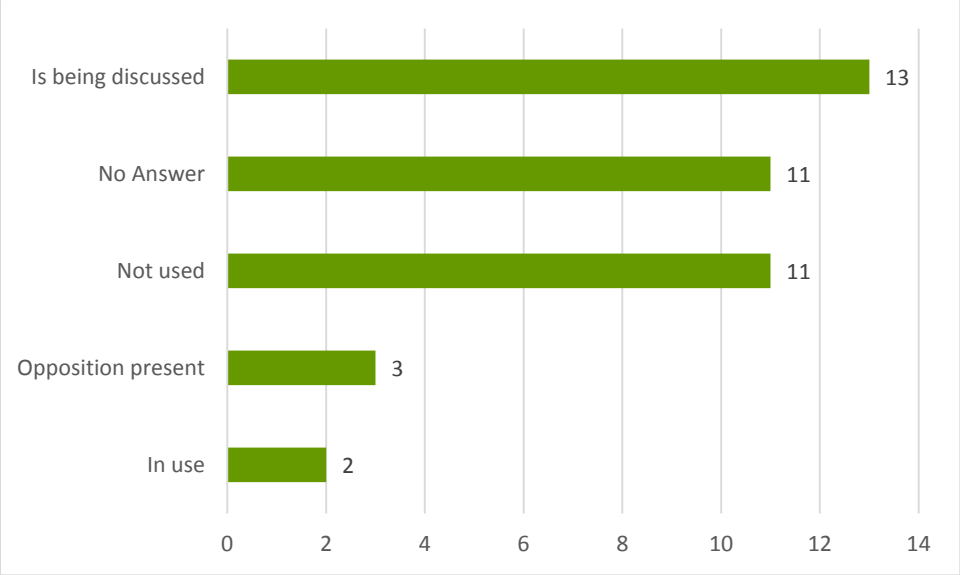

Figure 18: Status of altmetrics
(absolute numbers; N=40 expert interviews)

4.1.7 Advantages and Disadvantages of the current system

Asked about the advantages and disadvantages of the current system in use at their organization a bigger variety of disadvantages seemed to be present compared to the advantages.

Often the advantages seemed to be of a rather simple nature. Among the most often identified advantages was the objectivity of the systems in use, among them informed peer review. The fact that there are already many indicators in place, the ease of usage and the quantitative nature of the system where also mentioned as advantage. Other advantages as the used system being known also coincided with it allowing a certain comparability. Efficiency and centralization were also mentioned, but the interviewees also remarked that the efficiency was due to the simple or easy usage of the system and was not always considered to be a sign of high quality of the resulting output.

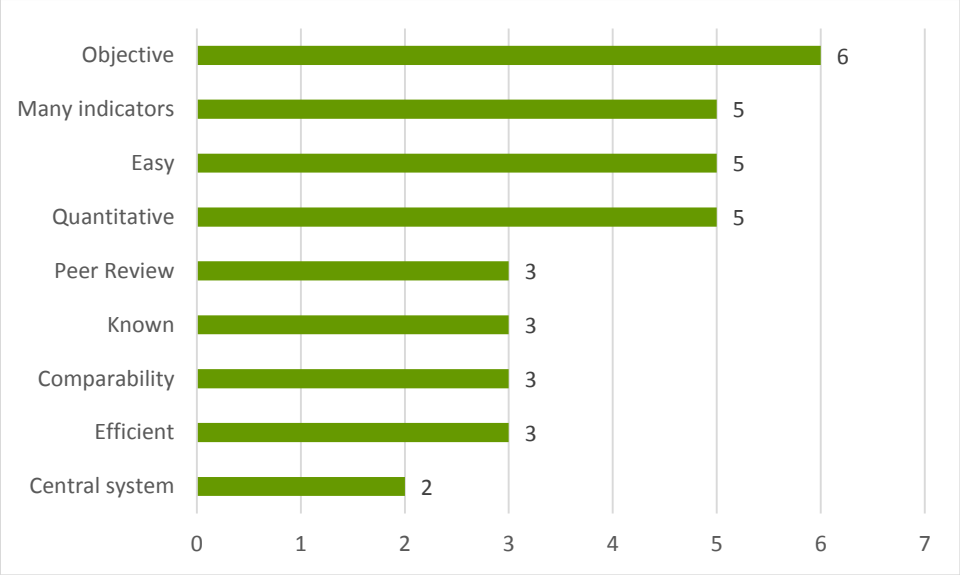

Figure 19: Advantages of the current system
(absolute numbers; N=40 expert interviews; multiple answers per interview possible)

The interview partners mentioned most disadvantages that have been discussed in this report in chapter 2. Additionally, the fact that the system was non-transparent, a disadvantage mentioned was that there seems to be a monopoly of service providers. In contrast, one of the top disadvantages seemed to be that there was not a single data base for everything. The fact that the applied science are being neglected was mentioned by several interview partners (not only by the representatives of universities of applied sciences).

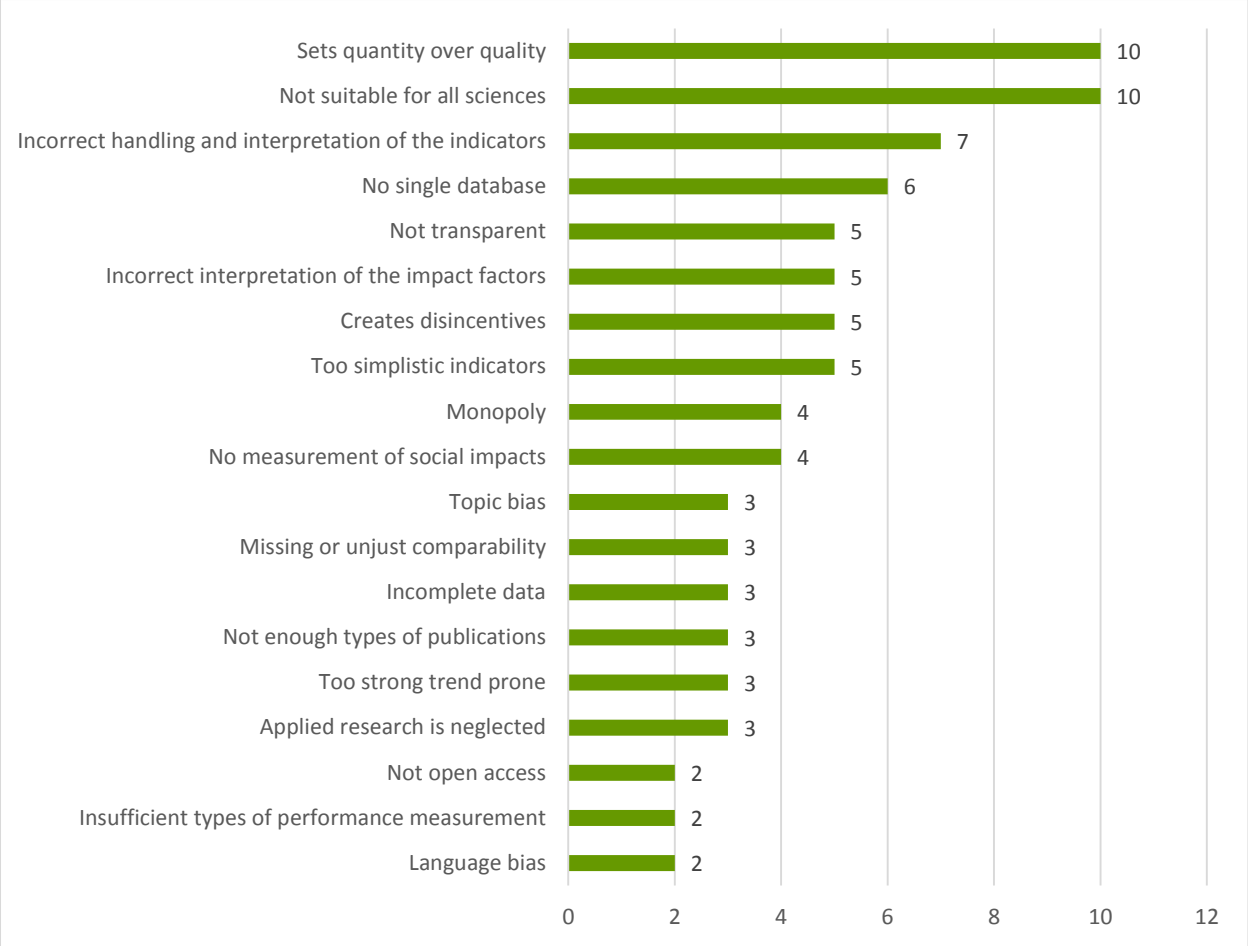

Figure 20: Disadvantages of the current system
(absolute numbers; N=40 expert interviews; multiple answers per interview possible)

4.1.8 Requirements for a new system

Asked about the requirements a new system should met in order to be accepted, the idea of completeness seems to be dominant. Completeness of indicators as well as of the analyzed data and sufficient publication types are among the top requirements. Also the need for additional methods and forms of evaluation performance were mentioned by many, not only to provide new forms of performance, but also new ways of looking at the impact of the scientific work done. An example for this was also mentioned by a few interview partners as the requirement to measure the social impact of the scientific performance.

Also the need of the system to not only allow quantitative analysis, but also qualitative methods of measuring publications was highly sought after. It was also mentioned that the system needed to provide transparency in order to be accepted.

Lesser required where the need for control over the data, also in form of being able to weight certain indicators and types of publication although it must be mentioned that the weighting can be seen as an inherent requirement for completeness of indicators and publication types.

Requirements like objectiveness or a bottom up approach toward the evaluation process were also put forward.

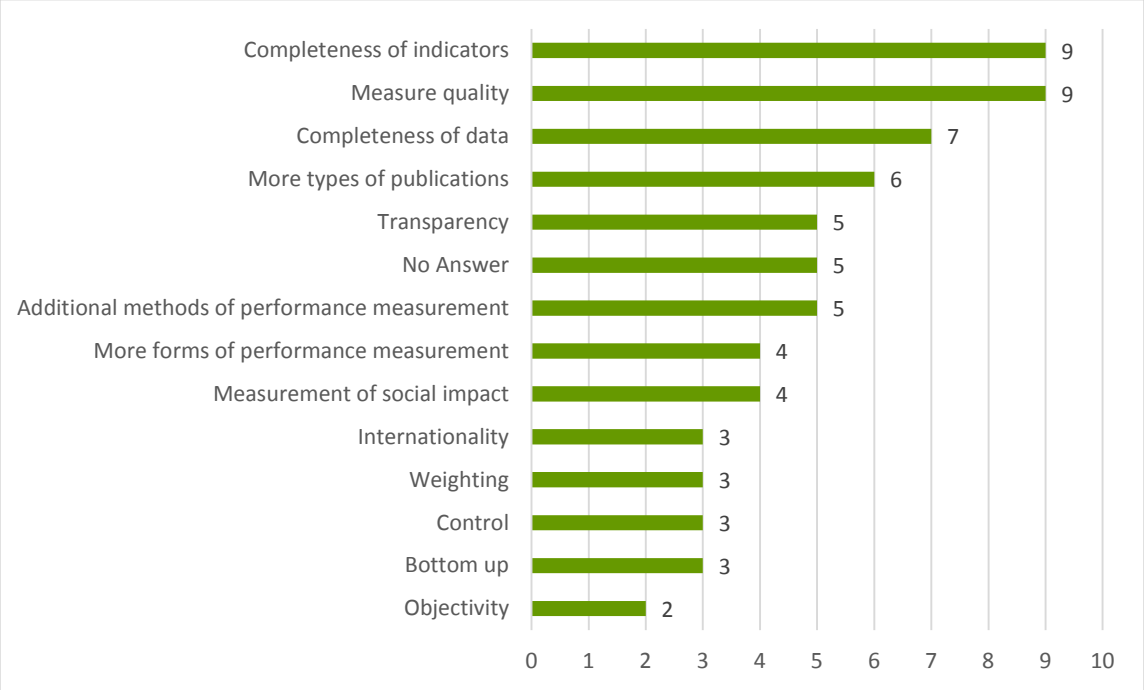

Figure 21: Requirements for a new system
(absolute numbers; N=40 expert interviews; multiple answers per interview possible)

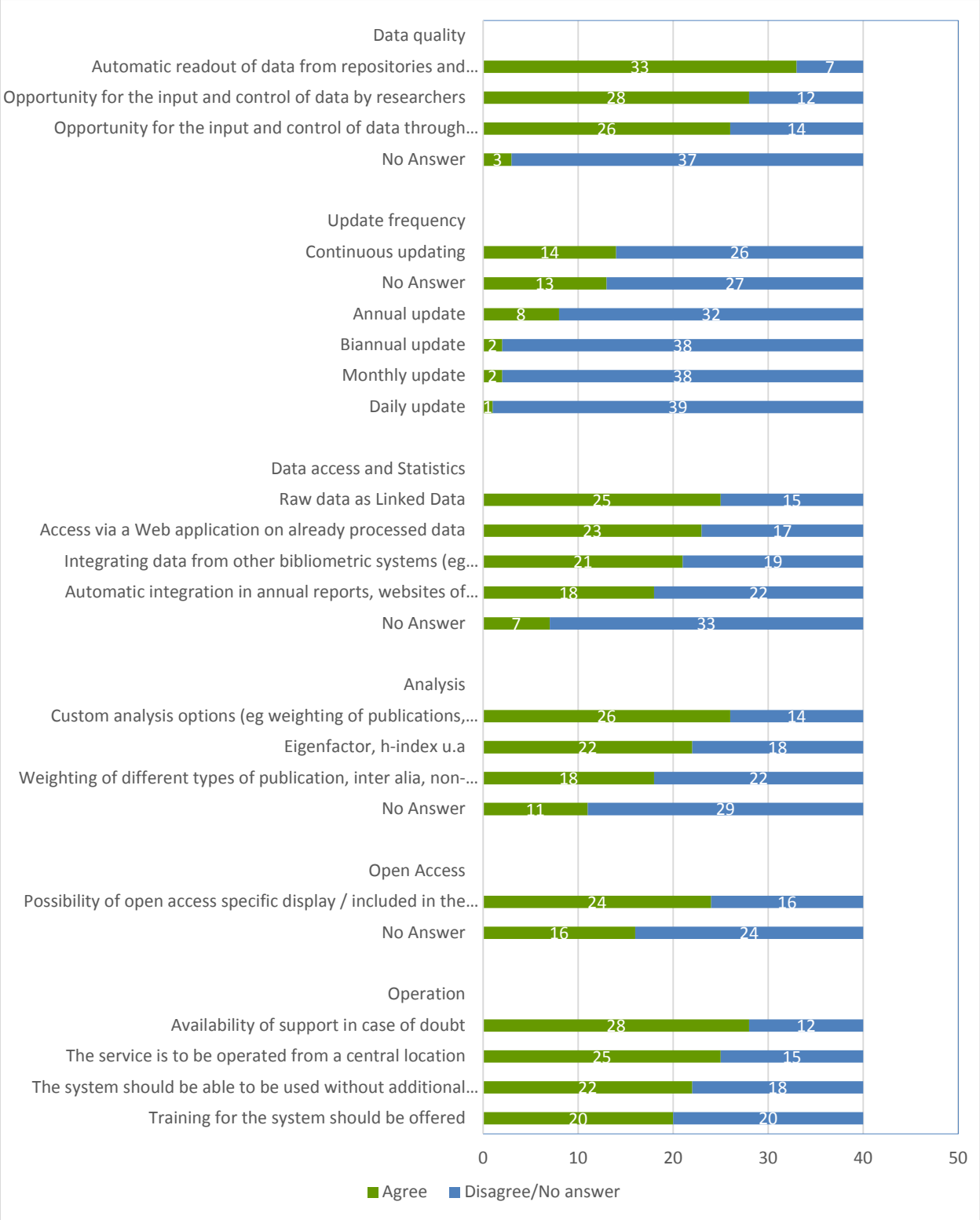

Figure 22: Features requirements of a new system
(absolute numbers; N=40 expert interviews)

When asked what options a new system would require the interview partners coincided with the already mentioned requirements. In the category data quality the requirements for completeness and control were confirmed.

The majority of the answers indicated that continuous updated data was desirable, but many chose not to answer the question. The need for only annual update was also quite high. In data access and statistics there was a big interest to be able to receive the raw data as linked data as well as the possibility to access already processed results. Although criticized by many still more than half of the interview partners thought that integration of other bibliometric systems such as the journal impact factor would be desirable in order to generate a complete picture of the performance. Less than half agreed that an automatic integration of certain data into annual reports or onto website was a feature the new system should have.

The options regarding analysis were also well received with the ability to customize the analysis options by weighting publications or outlets being the top choice in this category followed by additional analysis methods like calculating the h-index or eigenfactor. Weighting different types of publications received the least approval with less than half of the interviewees mentioning it to be a feature they would be interested in.

More than half of the interview partners agreed that Open Access specific display and analysis would be interesting or required. All the options in the category operation were well received. It must be noted that it was mentioned that a system that can be operated without any training could also lead to uneducated conclusions regarding the interpretation of the results.

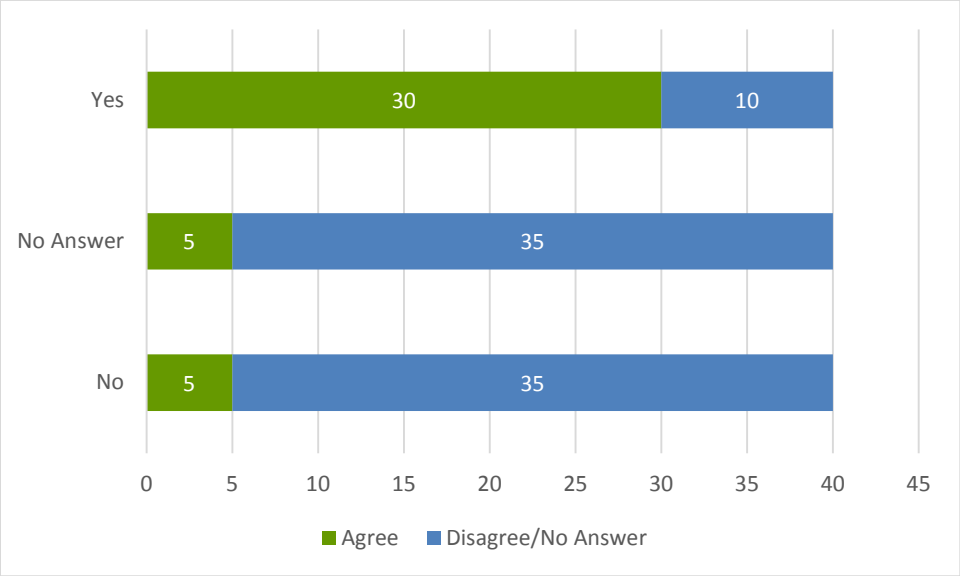

Figure 23: Need of more types of publications
(absolute numbers; N=40 expert interviews)

In conjunction with the replies to the question about the requirements towards a new system the question if such a new system should offer more publication in addition to journal articles, books and conference appearances confirms the need for more publication forms. The majority agreed that there is a need for more and only a few denied it. Suggested forms included multimedia files, artistic objects, but also concerts, exhibitions or patents. Furthermore, additional forms were suggested that are not considered to be a form of publication, but do also represent the value of scientific activity such as teaching, number of doctorates (or students) or projects. Although these additional indicators do not represent publication activities, the interviewees felt that they should be included in order to measure the performance of the researchers since these activities also prevent or hinder the researcher from publishing.

4.1.9 Usage of a new system

The expected increase of usage due to a new system correlates mostly with the current usage of the data. The more important the usage of the data for a specific task today, the more interviewees agreed that a new system would also elevate the importance of that task in the future. Most interview partners agreed to the statement that the evaluation of the entire organization as well as sub-organizations would increase.

Although publication to stakeholders is an important aspect in the usage of the data today, a new system would not increase this activity. Many interview partner mentioned that these publications have a strict format with well-defined indicators that needed to be published independent from the system in use thus not increasing the popularity of publications to stakeholders just because it's easier now.

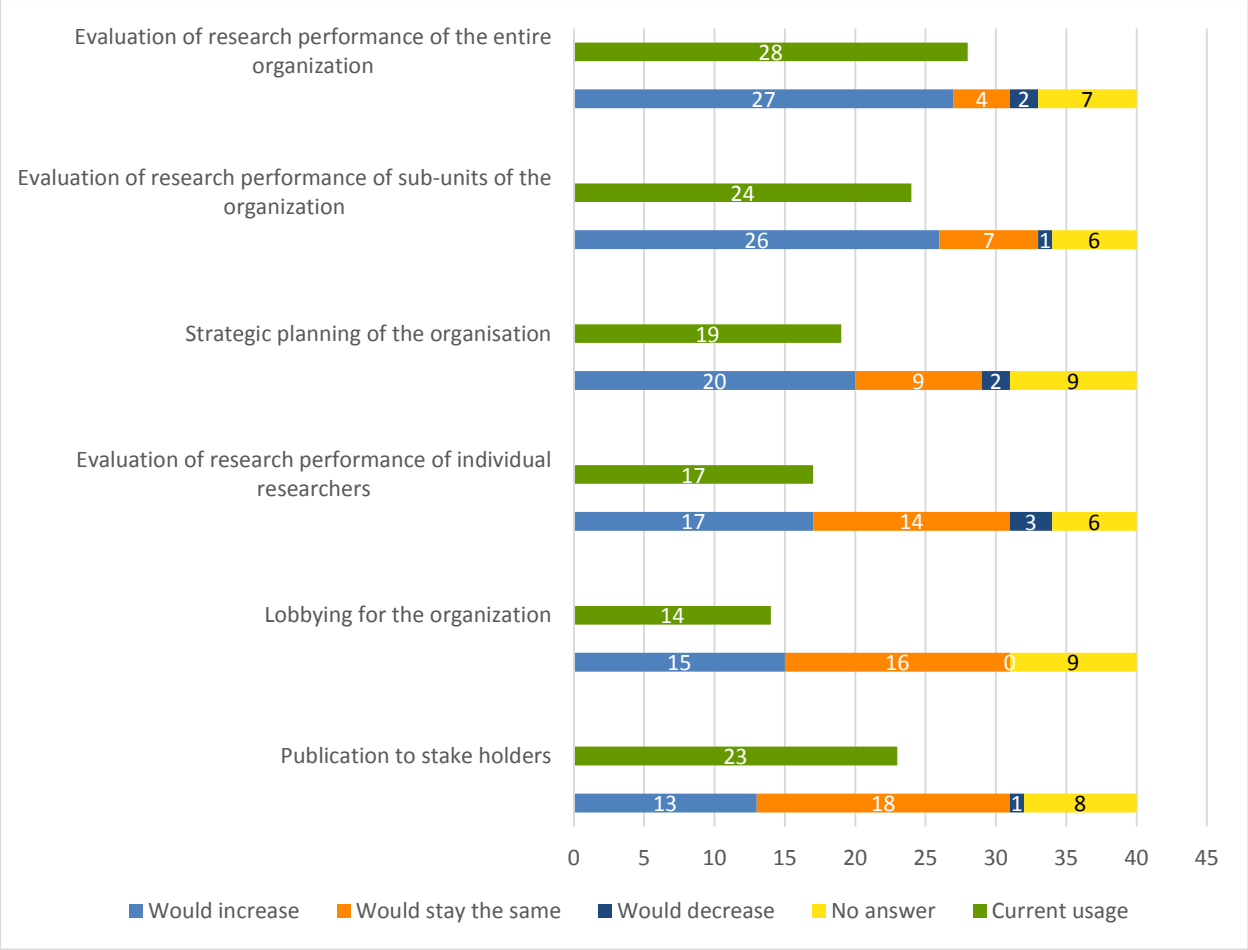

Figure 24: Usage of a new system
(absolute numbers; N=40 expert interviews)

When asked about the advantages of the new system most agreed that it can lay the foundation for an improved analysis of the publication behavior. While the majority agreed that the new system would be able to consider the differences of the scientific disciplines many also chose not to answer the question.

While there seems to be no consent in whether the individual achievements of the research could be presented comprehensively or could improve control of the scientific system the majority agreed that a new system would neither save time nor money compared to today.

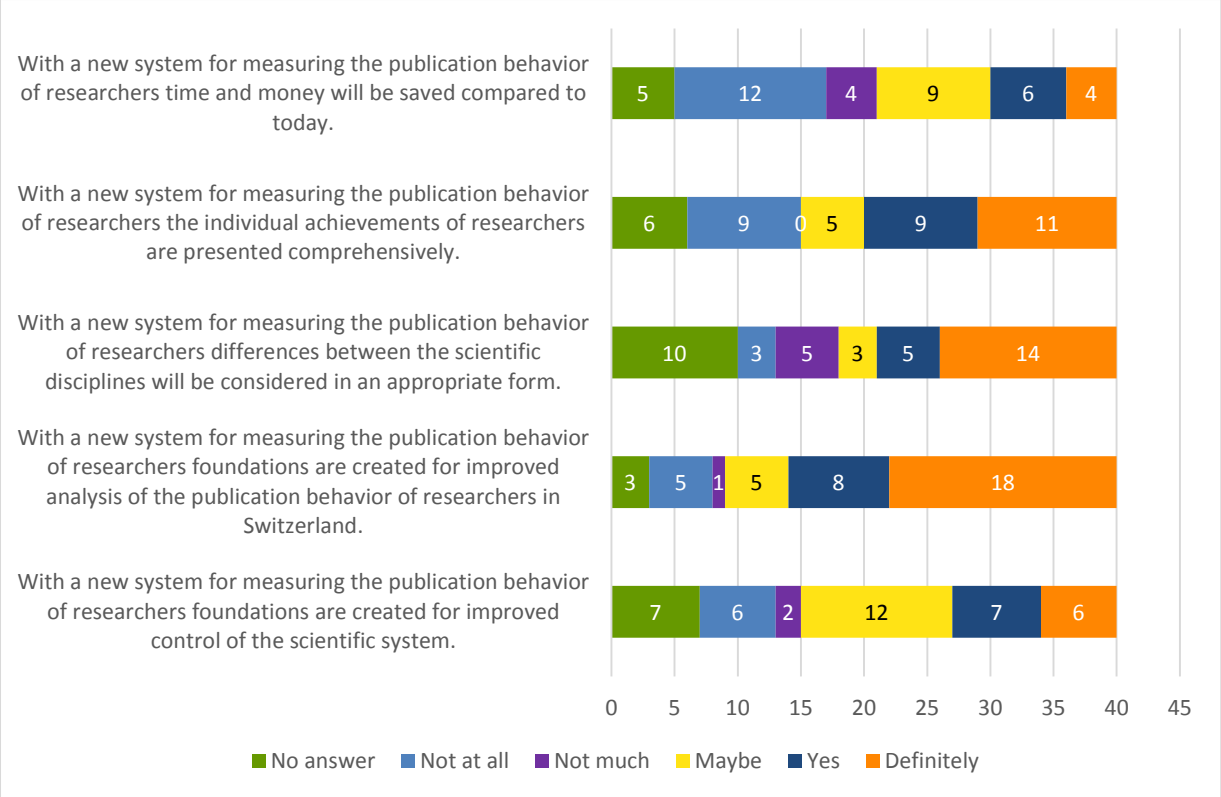

Figure 25: Advantages of a new system
(absolute numbers; N=40 expert interviews)

4.2 Requirements Analysis

The results from the expert interviews yielded a list of requirements for a conceptional system. This list has been ordered based on the experts' assessments, reflects the needs of the scientific community in Switzerland, and considers technical options and limitations of a follow-up project.

1. Provides comprehensive information on OA
2. User-oriented, consider differences between disciplines
3. User-defined analysis (OA, temporal, trends, …)
4. Consider other publication indicators (OA, Eigenfactor, …)
5. Automatic data acquisition, minimize manual effort
6. User-defined groups (e.g. project, department, …)
7. System needs to be transparent, well defined metrics
8. Provide read access and means to correct data & interop.
9. Include other indicators of research performance

A. Provide means for estimating social relevance
B. Integrate other factors (teaching, administration, ...)

An additional requirement has to be clarified that was an element of the call for projects, say the definition of publications to covered by SYMPHONY.

Since SYMPHONY aims at monitoring the publication behavior of researchers in Switzerland it is crucial to have a clear understanding of the publications covered by SYMPHONY. Based on the literature review and the expert interviews, we consider publications as relevant which fulfill the following two criteria:

1. At least one of the publication's authors is currently affiliated or has been affiliated with a Swiss research institution, and
2. The bibliographic entry has been published on the institutional repository or Web page of that research institution.

All publications of researchers which work in Switzerland are, therefore, entailed in this definition, regardless of the researcher's nationality. Publications of researchers that have moved to another country are only considered relevant, if they are still listed on in institutional repository or on the Web page of a research institution.

4.3 Scenarios

This section introduces scenarios for addressing the requirements discussed above. Section 4.4 (Coverage of SYMPHONY requirements) then elaborates on how well the suggested scenarios fulfill the stakeholder requirements.

The figure below illustrates the four main scenarios: (1) maintain status quo, (2) perform targeted studies, (3) create an infrastructure for monitoring the publication behavior of Swiss scientists, and (4) extends scenario (3) with a framework for assessing the societal impact of publications, projects and institutions. It is important to note, that these scenarios build upon each other as outlined in the following illustration 26, i.e. scenario (3) requires the implementation of scenario (2) since an infrastructure for monitoring publication behavior is not sensible without targeted studies that leverage this infrastructure for analyses.

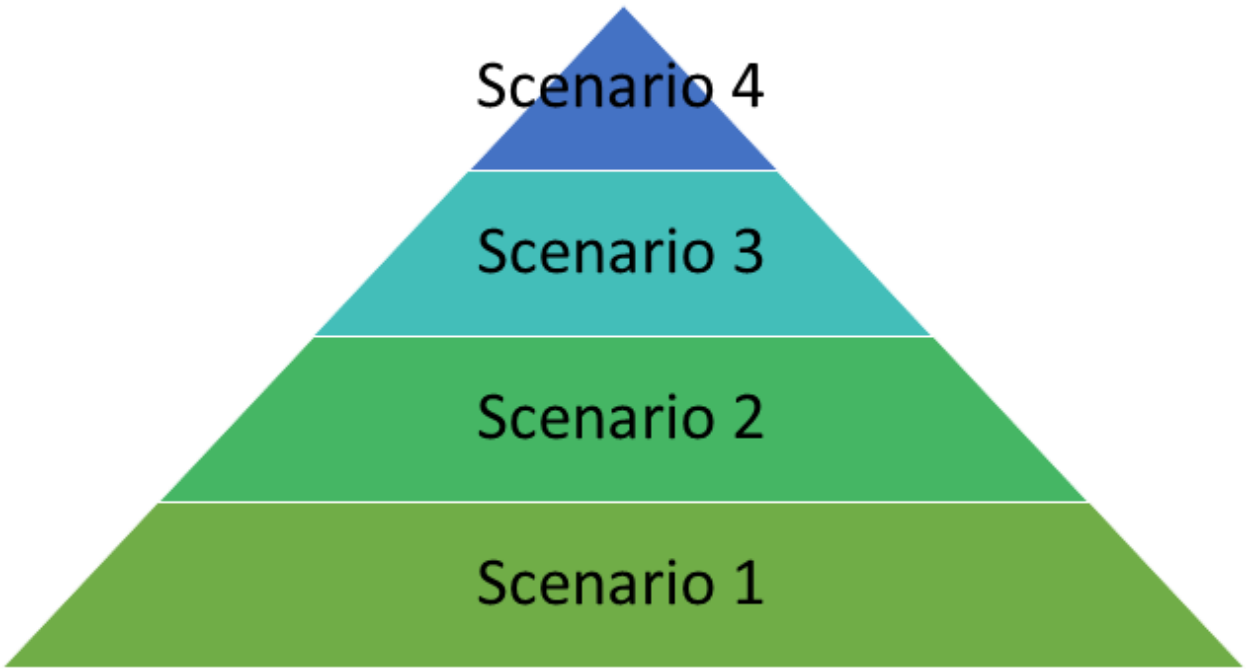

Figure 26: Building of the scenarios

4.3.1 SCENARIO 1: Maintain status quo

Perform studies based on the Web of Sciences.

Scenario 1 has some advantages: It provides measures for scientific performance that are internationally accepted within many scientific disciplines (mainly natural science, medicine and technology). Despite some criticism about a lack of transparency, it can also be stated that the bibliometric methods and results within that scenario are simple and well-defined.

However, there are also a number of important limitations and disadvantages linked to this scenario. First, and most important is the limited coverage of scientific disciplines. The humanities and many social science fields are only very selectively integrated in the key database (Reuter's Web of Science). And the level of differentiation for the included disciplines (e.g. medicine) is often not sufficiently detailed and does not cover all the specific subfields that would be necessary for an analysis within these subfields. Depending on the publication behavior within a field, these methods might bear a systematic bias against some research subjects in that field, yielding significantly lower impact factors for research covering these subjects since the relevant publication outlets - although authoritative for this kind of research - have obtained a lower overall ranking.

Further disadvantages are the lack of information on the publication format (open access or not) and a systematic bias against open access journals. This scenario can be useful for providing benchmark information, but due to the limited coverage of disciplines and the focus on a few and rather selective peer reviews journals, it cannot be used as a sound database for monitoring

the publication behavior of all scientific disciplines in a comprehensive way that includes the whole variety of outlets, topics, temporal developments etc. Finally, there is a systematic language bias in favor of publications in English. This is a systematic disadvantage for scientific disciplines in the Humanities (e.g. languages) that often have a regional focus and publish their research findings in the language under investigation.

4.3.2 SCENARIO 2: Targeted studies

The disadvantages of scenario 1 are manifold (see above). Scenario 2 can considered as a response and as an attempt to overcome some of the shortcomings of scenario 1. The main difference between scenario 1 and 2 are targeted studies that focus on specific research questions or individual scientific fields that are excluded or underrepresented in the dominant methodological approaches of scenario 1.

One example of such a targeted study with a focus on a specific research question is the SOAP project that was investigating the attitudes of researchers on, and the experiences with, open access publishing. The project team run a large-scale survey: Around forty thousand answers were collected across disciplines and around the world, showing an overwhelming support for the idea of open access, while highlighting funding and (perceived) quality as the main barriers to publishing in open access journals. This project was funded by the European Commission under the Seventh Framework Programme, and running from March 2009 to February 2011. The project was coordinated by CERN, the European Organization for Nuclear Research, and is a partnership of publishers (Springer, Sage, BioMed Central), libraries (the Max Planck Digital Library of the Max Planck Society) and funding agencies (the UK Science and Technology Facilities Council) (Dallmeier-Tiessen et al., 2011).

Another example for such studies is the research initiated within the SUC P3 program 2015 („Performance de la recherche en sciences humaines et sociales“- Research Performance in Humanities and Social Sciences). The list of projects funded within this program provides an impression of the diversity of disciplines and methodologies which need to be considered by a holistic approach towards monitoring publication behavior:

- Developing indicators for the usage of research in Communication Sciences
- Der Wertbeitrag betriebswirtschaftlicher Forschung
- Scientometrics 2.0: Wissenschaftliche Reputation und Vernetzung
- Forschungsevaluation in der Rechtswissenschaft
- Ressourcen-basiertes Instrument zur Abbildung geisteswissenschaftlicher Forschung am Beispiel der Theologie

- Cartographier les réseaux de recherche. Interactions et partenariats en sciences humaines et sociales
- National vergleichbare Daten für die Darstellung und Beurteilung von Forschungsleistungen

The methodology that has been used to develop performance metrics in the SUC-P3 program can be labelled as bottom-up approach: Each of the involved disciplines was closely involved and actively participating in the entire process of defining what indicators of scientific output (e.g. publication formats, journals etc.) should be used and how the data collection and analysis should be done. Most of these initiatives did not aim at the development of a judgmental metrics (benchmarking between organizations) but rather had the intention to increase the visibility of the research and to represent the diversity of topics that are covered by the various research units.

The main advantages of this scenario 2 (in comparison to scenario 1) are the detailed and in-depth studies that can be adapted to the specific needs of each individual disciplines. One example is the typology of research assessment criteria that was identified as a result of a Delphi survey in the Humanities (see Ochsner, Hug, & Daniel, 2012).

However, this advantage of focusing on individual disciplines is ambivalent and can also be considered as a disadvantage. Due to the fact, that each discipline is developing its assessment criteria and methodology independently, no aggregated or comparative analysis are possible. This lack of standardized data prevents also the publication of research results as open data and a secondary data analysis. Most of these initiatives used a sophisticated combination of methods (survey and stakeholder interviews, text analysis) but only a few of them relied on bibliographic data that would also be of high interest for a secondary data analysis (e.g investigating the diffusion of open access publication formats), since the cost of obtaining such data is currently prohibitively high.

Further important disadvantages of scenario 2 are the high efforts that are necessary due to the specialized methodology for each discipline. Last but not least, scenario 2, has a limited continuity due to the end of the program P3 in 2016. This is not only true for the national, but also the international level (e.g. no plans for continuing the SOAP project mentioned above). On that background, an analysis of long-term changes in the publication behavior of scientist is not possible within scenario 2.

4.3.3 SCENARIO 3: Build an infrastructure for monitoring the publication behavior of Swiss scientists

One of the major shortcoming of scenario 1 and 2 is their very restricted data base. Questionnaires as well as the Web of Science only cover a very small fraction of the total volume of publications and are usually restricted to (a) the selected test subjects, or (b) the selection of journals that are covered by the Web of Science. This is especially problematic since

1. There are disciplines such as computer science where other publication outlets (e.g. prestigious conferences) are considered very important and sometimes as competitive as prestigious journals
2. They provide some well-established (but controversial) performance metric but only very limited means to monitor the publication behavior
3. The Web of Science has a bias against newer publication outlets which especially affects open access.

Scenario 3 addresses these issues by providing means to collect and integrate bibliographic data and, therefore, making it available for analysis (please refer to the technical description below for more details).

Scenario 3 has the following advantages: It closes the data gap by acquiring and integrating bibliographic data from *existing* sources (institutional repositories, databases, academic social networks etc.). This approach has also advantages in terms of data quality, efficiency (i.e. researchers are not required to enter data in yet another interface), and allows for a decentralized user support within institutions (i.e. the staff responsible for the repositories ensures the quality of SYMPHONY data by maintaining a high data quality within their repositories).

Scenario 3 allows the inclusion of arbitrary publication metadata (e.g. open access, related research projects). This meta data can include further important background information on outlets (e.g. open access fees, participating institutions) that allows user-driven and user-oriented analysis of the publication behavior (e.g. fees payed for open access, temporal studies, importance of outlets, topics etc.).

Scenario 3 can built on the insights gained from targeted studies by considering and integrating differences between disciplines and organizations. These and other methodological decisions will be documented in an open and transparent way. Scenario 3 can increase the efficiency of data collection not only on the input side (use of existing sources) but also on the output side by promoting the reuse of the collected data -- e.g. for institutional Web pages, annual reports, or different analyses of the publication behavior.

Due to the integrated approach that aims at a comprehensive collection of bibliographic data from all researchers in Switzerland, a comparative analysis of public behavior across disciplines can be realized. Scenario 3 aims at establishing a new and sustainable infrastructure.

Therefore, further comparative analysis are possible that address long-term changes in the publication behavior of scientists. Last but not least, scenario 3 has the potential to increase the visibility of Swiss bibliographic data on a national and international level because of its centralized approach.

Despite the many advantages, there are also some disadvantages of scenario 3: Scenario 3 includes only bibliographic data without additional information on the impact of a particular publication (e.g. citations by other scientists, impact in mass media etc.). Another disadvantage are the costs necessary to create and to maintain an additional publication monitoring infrastructure.

Technical description

The following flowchart outlines the planned workflow for scenario 3. Researchers publish their bibliographic information on institutional repositories, databases, and in academic social media - walled gardens that only contain fractions of the total bibliographic information on researchers in Switzerland.

Scenario 3 builds an infrastructure that collects and integrates bibliographic information from these sources, identifies authors and outlets, and saves them in a bibliographic repository. The system will also comprise a knowledge source that contains information on research institutions and outlets (e.g. open access, open access fees, Impact factors, etc.) that can be leveraged for later analysis.

The extent and number of data sources considered in this collection process (institutional repositories, academic social networks and institutional Web pages) should be determined by the needs of the institutional partner's supported by SYMPHONY. For example, if all use case partners already use institutional repositories or publication pages on their websites, there won't be any need to support collecting bibliographic information from personal webpages.

Data access modules allow export of the bibliographic data. Scientists may also correct entries or extend them with further metadata (e.g. funding, open access, etc.). SYMPHONY's export formats will support the text export for annual reports, various bibliographic formats (BibTex, RIS, etc.) and also a micro data enriched webpage export for easy inclusion in an institution's or researcher's Web page.

Data analysis modules enable an efficient analysis of the collected data. SYMPHONY will include a set of pre-defined analysis methods (e.g. trend studies, aggregated reports, open access usage, popularity of journals, collaboration networks, importance of research topics …) which will be developed based on targeted studies that consider the differences between scientific disciplines and organizations. In addition, the data on the publication behavior will be complemented with further data obtained by these targeted studies to provide a more holistic

assessment. Scenario 3 will enable much more sophisticated targeted studies, since it provides these studies with comprehensive data on the publication behavior of Swiss scientists.

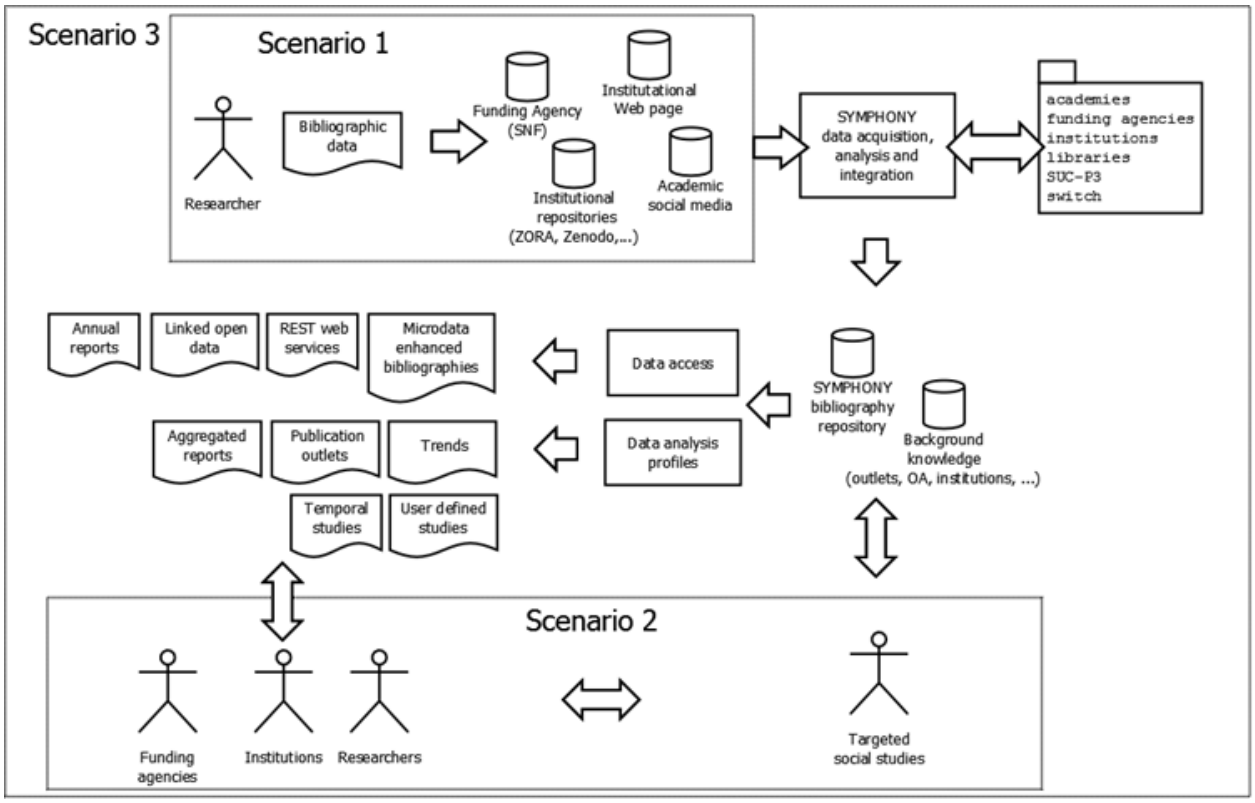

Figure 27: Infrastructure of scenario 3

The following modules can be considered as additional technical and organizational options to be included in scenario 3:

4.3.3.1 Use of unique author identifier (e.g. ORCID)

The use of unique author identifiers is a necessary and sound step that solves a number of name identification problems (e.g. distinguishing between researchers that have identical names or tracking researchers that change their name due to marriages or other reasons).

From our point of view, the author identification by ORCID identifiers seems to be a promising approach that will be carefully evaluated in the follow-up project. ORCID is an open, non-profit, community-driven organization that provides a unique and persistent identifier to researchers, connecting them with their activities through integration in key research workflows. ORCID is supported by over 300 science organizations, including many universities and the most important science publishers (see ORCID, 2015).

4.3.3.2 Links to the original publication

SYMPHONY only stores bibliographic information but no publications as such. Therefore, scenario 3 will also aim to provide convenient ways to access the full text of publications by adding links to the repository from which the bibliographic information has been obtained (institutional repositories, library catalogs, etc.) and providing identifiers such as DOIs and ISBN numbers.

4.3.4 SCENARIO 4: Build an infrastructure for monitoring the publication behavior of Swiss scientists and its public impact

Scenario 4 is the most comprehensive and most sophisticated scenario that extends scenario 3 with a Web intelligence framework in order to analyze the impact of Swiss research in public sphere (mass media, social media etc.).

Scenario 4 has the following advantages: It provides encompassing data on the representation of Swiss research in mass media that are used not only by scientist, but a by general public. This approach of measuring public science communication can be helpful for answering important research questions regarding the number of mentions, the sentiment of these mentions, the terms associated with research projects, institutions and research topics etc.). Such media monitoring systems can be instrumental for tracking changes in the public understanding and the public support for science. In addition, they can serve as early-warning systems that identify controversies around science in an early stage that allows to develop adequate reactions. Furthermore, scenario 4 provides a valuable data infrastructure for researchers that are interested in comparing the coverage of issues and controversies (e.g. human cloning, scientific fraud) in scientific and mass media outlets.

The disadvantages of scenario 4 are (similar to scenario 3) that not all research impacts are considered (e.g. no data on citations by other scientists). In addition, it seems to be a sound assumption that many research organizations (universities etc.) are already monitoring their media coverage in one way or another. On that background, the only additional benefit of scenario 4 would be providing access to this media data to all interested science organizations, which will could probably also be considered a disadvantage by some stakeholders. Finally, another important disadvantage of scenario 4 is the increased maintenance costs.

4.4 Coverage of SYMPHONY requirements

This section discusses on how well the requirements identified in Section 4.1 are covered by the scenarios introduced in the previous section. Table 1 shows the fulfillments of these requirements by the four scenarios.

Requirement (importance) Scenario →	1	2	3	4
1. Provides comprehensive information on OA	~	~	✓	✓
2. User-oriented, consider differences between disciplines	~	✓	✓	✓
3. User-defined analysis (OA, temporal, trends, …)	-	-	✓	✓
4. Consider other publication indicators (OA, Eigenfactor, …)	~	~	✓	✓
5. Automatic data acquisition, minimize manual effort	-	-	✓	✓
6. User-defined groups (e.g. project, department, …)	-	-	✓	✓
7. System needs to be transparent, well defined metrics	✓	✓	✓	✓
8. Provide read access and means to correct data & interop.	-	-	✓	✓
9. Include other indicators of research performance	-	~	✓	✓
A. Provide means for estimating social relevance	-	-	-	✓
B. Integrate other factors (teaching, administration, ...)	-	-	-	-

Table 1: Fulfilment of requirements

4.5 Suggestions for reducing project complexity and risks

The following section suggests strategies for reducing the project complexity and risks for the scenarios 3 and 4.

1. *Early cooperation with SWITCH*
   SWITCH is considered an important partner and stakeholder and has, therefore, also been interviewed in the SYMPHONY pre-study. Integrating SWITCH at an early project stage will considerably reduce the effort required for operating the project infrastructure once the implementation project has been completed.
2. Create an initial prototype with a limited coverage in terms of
   a. data sources
   b. disciplines
3. Complement technical approaches with social studies to ensure that the created analyses are relevant to the stakeholders.
4. Draw upon the know-how of the SUC-P3 projects which already perform targeted studies for multiple social sciences.

Disciplines that are particularly suitable for a use case are chemistry, history, languages, political science, law, mechanical engineering, sociology and theology.

4.6 Success stories

This section describes two success stories of systems that share with the SYPHONY project the goal of providing an infrastructure that is instrumental for the monitoring and the analysis of publication behavior of scientists and can be considered at least to some extent as role models.

4.6.1 CRISTIN (Current research information system in Norway)

Several countries in Europe and beyond have started efforts to implement so called Current Research Information Systems (CRIS). These efforts are coordinated by the organization euroCRIS with more than 200 members. One of the main activities of euroCRIS is "the development and curation of the international standard data model for research information called CERIF: the Common European Research Information Format." (euroCRIS, 2015).

CRIStin is an example of such a national current research information system that is built according to the CERIF data model. CRIStin describes its goals as follows:

"CRIStin aims to increase the social value of research by making it possible for research from several sectors to be viewed in the same context.

- To give Norwegian researchers access to relevant information as a basis for their work
- To render Norwegian research visible, both nationally and internationally
- To streamline the everyday work of researchers and research institutions – more research, less administration" (euroCRIS, 2015).

In other words, the main features of CRIStin can be summarized with the following points:

- Multidisciplinarity ("research from several sectors to be viewed in the same context.")
- Usefulness for researchers ("to give Norwegian researchers access to relevant information", "more research, less administration")
- Usefulness for research institutions ("to streamline the everyday work of researchers and research institutions")
- Higher national and international visibility of the research

This list illustrates that a successful system for monitoring the publication behavior of researchers should satisfy not only the the needs and requirements of research institutions and their managers, but also those of the researchers. This increases on the hand the complexity of the task, but on the other hand also the market potential for such a multifunctional information system.

All the features of CRIStin mentioned above match perfectly with the goals of SYMPHONY. On that background, we consider CRIStin as a role model and source of inspiration for the SYMPHONY project. Nevertheless, there are also some differences. The SYMPHONY project is focusing on scientific publications, but CRIStin has a much broader scope that includes:

- CRIStin is a national research information system and therefore includes and covers not only scientific publications, but further relevant data on research (e.g. research projects, research units and competency profiles of individuals).
- CRIStin is the head of several national library consortia and in that function managing license agreements on behalf of Norwegian research libraries from the public sector.
- CRIStin is a coordinator at national level – for example within the Open Access system.

4.6.2 INSPIRE

In a joint effort CERN, DESY, Fermilab and SLAC built a High Energy Physics (HEP) information system called inspire (available under www.inspirehep.net).

Based on the Stanford Physics Information Retrieval System (SPIRES) database inspire works closely with other repositories that publish High Energy Physics content like arXiv.org, NASA-ADS, PDG, HEPDATA and other sources of information (inspirehep.net, 2015).

INSPIRE is a user-driven information system that is powered by the Invenio digital library technology which is also used in CERN's own library or the Zenodo open digital repository. It offers author disambiguation and profiles for the researcher including bibliometric data (Interactions.org, 2008).

INSPIRE and the software it is based upon offer a wide variety of services:

- citation analysis,
- fulltext search,
- extraction of figures from fulltext,
- search in figure captions,
- automatic keyword assignment,
- metadata harvesting,
- retrodigitization,
- ingestion and automatic display of LaTeX and
- storage of supplementary materials like Mathematica notebooks

(Holtkamp, Mele, Simko, & Smith, 2010).

As such, INSPIRE servers as a good example of what is not only technically possible, but how to build a platform to serve the users and authors by understanding their drivers and barriers.

4.7 Workshop in Bern

The workshop took place on Friday, 12th of June in Bern. There were a total of 19 participants (11 stakeholders from various science organizations, two representatives of the SUC P2 program management (Roland Dietlicher and Gabi Schneider) and six members of the research team.

Up to the time of the workshops 31 interviews were carried out and evaluated. For the preparation of the workshop the research group has evaluated the hitherto conducted interviews and worked out four scenarios. At the workshop the participants received a folder with a printed version of the presentation, the list of participants and the "letter of support" and "letter of intent".

The aim of the workshop was to present the first results and the analysis of the conducted interviews, present the resulting scenarios and allow the stakeholders to evaluate them. The four scenarios and the discussion of them with the stakeholders served as starting point for the planning of the submission of a follow-up project to SUC. The workshop was structured as follows:

Time	Topic	Responsibility
9:15	Welcome	R. Dietlicher
9:20	Introduction	U. Dahinden
9:25	Results of the expert interviews	F. Odoni
10:05	Scenarios: Symphony Development	A. Weichselbraun
10:30	Coffee Break	
10:50	Discussion of Scenarios	all (moderated by U. Dahinden)
11:40	Next steps: Follow-up project Symphony	A. Weichselbraun
12:00	End of workshop, lunch	All

Table 2: Program of the workshop in Bern

After some welcoming words by Roland Dietlicher, in which he outlined the goal of SUC P-2 and the symphony project briefly, Urs Dahinden introduced the team, the project and the goals

of the workshop. At the workshop an overview over the first preliminary results of the - up till then conducted interviews - was presented. This overview included the results of following topics:

1. Importance of different indicators
2. What the collected data is used for
3. Open Access Barriers
4. Usage of bibliometrics
5. Wanted features
6. Usage of a new system
7. Advantages of a new system

Two main statements were asserted by most experts at the interviews. They led to intensive discussion during the workshop:

1) Different disciplines/institutions cannot be compared with each other in a fair way.

2) Different disciplines cannot be measured the same way.

During the presentation the stakeholders mentioned their concern towards the costs especially concerning Open Access.

The presentation of the results was followed by the four scenarios developed by the project team. The scenarios are presented in more detail in section 4.3.

Discussion of Scenarios

In order to prepare the discussion of the four scenarios the project group prepared a poster for each scenario allowing the experts to express their opinions by writing them down on color coded cards. The experts received green (I like it, because ...), red (I dislike it ...) and white (thoughts, suggestions, questions) cards that could be attached to the respective scenario. The experts were free to engage in discussions among each other before discussing the allocation of the cards to the scenarios. The representatives of the SUC P2 program management did not take part in this evaluation.

Scenario 1 has received more negative feedbacks than positive, whereas scenario 2 had more positive than negative comments. Most cards were assigned to the scenarios 3 and 4, where the red and green cards were distributed fairly balanced.

Scenario 1 corresponds to maintaining the status quo. For the experts, it is too limited and one-sided. Moreover, it does not take the disciplinary diversity into account and is almost completely dependent on private providers. For someone, it covers current needs.

Scenario 2 (Perform targeted studies) seemed to be more accepted than scenario 1. It has been commented negatively that it exists already but that there is an uncertainty with regard to the sustainability (validity of a targeted study). On the other hand, it was positively seen as a nice to have, user-oriented system that distinguishes between the disciplines, even though it is time-intensive.

The creation of a new infrastructure for monitoring the publication behavior of Swiss scientists, as shown in scenario 3, has motivated the stakeholder to express different statements and opinions. For some discipline, it has little additional benefit and high development costs compared to the few benefits. In addition, there emerged some uncertainty regarding the completeness of the available data and the comparability of them. Such a system should also connect quality and quantity, but the way to reach that goal was perceived as open. For the stakeholders scenario 3 also appears as the most complete scenario at a reasonable cost, with additional indicators and the possibility to gather further data. Moreover, it contributes to the specific variety of scientific disciplines.

The comments on scenario 4 (New infrastructure: Monitor research output and its public impact) were similar to scenario 3. There was some uncertainty with regard to the costs and the fact that there is no established method so far. But it was mentioned as an advantage that user can define groups and indicators for the social relevance. It detects disciplinary differences taking into account the social dimension and the public impact of science that is gaining importance.

The discussion showed, that a change of the current system is desired, but many questions remain open. The experts were interested in issues surrounding the cost of setting up a new system and its maintenance, as well as the transfer of existing data sets, especially taking into account the different disciplines and institutions. It was stressed that reaching the goal to investigate and capture the research and publication behavior and the measuring factors requires an effort with differentiation between the disciplines. Another important point was that the collection of data does not imply a specific use of it and that the latter has to be discussed and determined by all stakeholders involved in that process.

Further remarks in the discussion addressed the quality of the data. A comparison with other areas such as public management, where certain experiences have been gained, was suggested as helpful for preventing failures. The experience of the past 20 years in this regard should be included in the scenarios.

5 Outlook and Conclusion

This final chapter will summarize the main conclusions of the preceding chapters and give an outlook on the planned follow-up project SYMPHONY - Proof of concept.

Chapter 2 provided an overview of the state of the art and a review of the scientific literature. Bibliometrics, a methodology originally designed in the field of library and information science in the late 1960s (Norton, 2010), has become a major tool for benchmarking science, both on the level of individual scientists or groups of scientists and on the level of institutions and bigger entities like universities or the entire countries. However, applying bibliometrics as a benchmarking tool is only one of several other applications. Since decades, the research on bibliometrics has focused on other possible applications. Quite often such studies use modified forms of bibliometric analysis to gather information on scientific communication, the work of scientists or ways of scientific advancement without benchmarking or evaluation of perceived quality. SYMPHONY also focuses on such "soft" aspects of publication behavior since they are considered a promising approach towards obtaining a holistic assessment of the publication behavior of researchers in Switzerland.

Chapter 3 described the methodology that was used in this project for the development of the scenarios. Due to the considerable heterogeneity of the Swiss science system, a stakeholder dialog (40 interviews with 44 individuals) was initiated that involved key players (research organizations and universities, funding agencies, policy makers etc.) on their current practice of measuring the quantity and quality of scientific output with a focus on publication monitoring (technical infrastructure, financial resources, organizational guidelines and processes) and their needs and requirements for a new or adapted infrastructure.

The results of these interviews show that the dominant practice of measuring the quantity and quality of scientific output can be labelled as rather traditional: The main reason to gather data on the scientific output was the evaluation of the research performance. The most important indicator that is used in such performance measurements is the number of publications in peer reviewed journals. However, most experts that we interviewed were critical about the current practice and mentioned a number of important shortcomings liked the under representation of a number of scientific disciplines (e.g social sciences, humanities) and the systematic bias against many important scientific publication formats (e.g. narrow selection of books and book chapters, exclusion of peer reviewed journals that are not included in the dominant bibliometric data base). Furthermore, no information is gathered in the current practice whether a publication is Open Access or not, which hinders a systematic analysis of the diffusion of this publication format. In

The following key requirements for a conceptual system were identified:

1. Provides comprehensive information on OA
2. User-oriented, consider differences between disciplines
3. User-defined analysis (OA, temporal, trends, …)
4. Consider other publication indicators (OA, Eigenfactor, …)
5. Automatic data acquisition, minimize manual effort
6. User-defined groups (e.g. project, department, …)
7. System needs to be transparent, well defined metrics
8. Provide read access and means to correct data & interop.
9. Include other indicators of research performance
10. Provide means for estimating social relevance
11. Integrate other factors (teaching, administration, ...)

They reflect the needs of the scientific community in Switzerland while considering the technical challenges and limitations of the follow up project.

The requirements are ordered by number of mentions in the interviews, which can be considered as indicator of importance for the stakeholders. This list is long and satisfying all these demands and criteria is certainly challenging.

Based on the findings from the experts' interviews, the project team developed the following four scenarios:

(1) Maintain status quo

(2) Perform targeted studies

(3) Create a new infrastructure for monitoring the publication behavior of Swiss scientists

(4) Scenario (3) plus a framework for assessing the societal impact of publications, projects and institutions

These scenarios are not independent but rather build upon each other (e.g. scenario 2 includes scenario 1 etc.). Illustration 30 shows the fulfillments of these requirements by the four scenarios.

Requirement (importance) Scenario →	1	2	3	4
1. Provides comprehensive information on OA	~	~	✓	✓
2. User-oriented, consider differences between disciplines	~	✓	✓	✓
3. User-defined analysis (OA, temporal, trends, …)	-	-	✓	✓
4. Consider other publication indicators (OA, Eigenfactor, …)	~	~	✓	✓
5. Automatic data acquisition, minimize manual effort	-	-	✓	✓
6. User-defined groups (e.g. project, department, …)	-	-	✓	✓
7. System needs to be transparent, well defined metrics	✓	✓	✓	✓
8. Provide read access and means to correct data & interop.	-	-	✓	✓
9. Include other indicators of research performance	-	~	✓	✓
A. Provide means for estimating social relevance	-	-	-	✓
B. Integrate other factors (teaching, administration, ...)	-	-	-	-

Table 3: Fulfillment of requirements

Table 3 shows as a general trend, that the scenarios with a higher number and more functions are also fulfilling more requirements. Nevertheless, even the most comprehensive and most expensive scenario 4 is not able to meet all demands that were mentioned by the experts.

These scenarios were presented to the experts and stakeholders at the project workshop with the opportunity to comment and to give feedback. One important result of the workshop was that the participants recommended to focus on scenario 3 for the further project development by aiming at the creation of a new infrastructure with a clearly and narrowly defined task to monitor the publication behavior of Swiss scientists.

What are alternatives to the proposed approach of building a new infrastructure for the scientific institutions in Switzerland? There is only one serious alternative: To choose one or several of the commercial systems that are offered by private companies (e.g. Research Gate, Google Scholar, Web of Science etc.). The disadvantages of such a commercial option are obvious and manifold: These commercial systems use internal algorithms and metrics that lack the transparency and legitimation that is needed for an important scientific infrastructure. There is also the question, of whether the companies operating such systems would be willing to share these data, since it is often considered part of the company's intellectual property and provides the company with a crucial advantage over its competition.

Furthermore, the users of these systems have no right to influence and to participate in the construction process of the systems and its options for data analysis. Last but not least, building a national science infrastructure on the shaky ground of a privately owned system creates a dangerous dependency and a number of risks (e.g. withdrawal of the service or arbitrary increases of prices). Following this line of argumentation, this commercial option has to be considered as a worst case scenario that should be avoided.

The project teams plans to submit a follow-up project with the title "SYMPHONY - Proof of concept". This follow-up will focus on scenario 3 that will be revised and completed with further suggestions obtained from the stakeholders at the workshop. The follow-up project will not compete with given local bibliographic data collection processes of (e.g. institutional repositories) but rather complement and build-upon them. Data collection will be organized in a lean and efficient way by re-using existing bibliographic data from institutional repositories and by complementing them with additional data (e.g. specific views and analysis to be developed in cooperation with various scientific disciplines). Scientific libraries will play a key role as contact points, and provide information, training and first level-support for researchers (data acquisition, data analysis). By integrating the key stakeholders (researchers, research managers, libraries etc.) from the very beginning in the process of system development, the risk of creating an infrastructure that does not meet the demands and requirements of the future users can be minimized. The purpose of this system will not be the implementation of judgmental metrics but rather increasing the visibility of Swiss research on the national and international level. Creating a new infrastructure according to scenario 3 has the potential to strengthen Switzerland's reputation as a top location for education and research and as an attractive partner in international research collaboration. This increased visibility and transparency is not only an advantage for the researchers, but also instrumental for public science communication with an interested but also critical audience, that - in their role as tax payers - provides an important financial contribution to research in Switzerland.

One important lesson learned in this pre-study has been the insight, that (due to the complexity of these tasks and the high number of stakeholders involved in the Swiss science system), SYMPHONY's ambitious objectives cannot be met in a short-term effort, but require a mid- to long-term perspective. Therefore, the new project "SYMPHONY Proof of concept" is conceptualized as a first step in this direction which will include a limited number of important stakeholders' representative to the diversity of the Swiss scientific community with regard to criteria such as size of organization, scientific disciplines, type of organization (national versus cantonal universities, universities of applied sciences), language regions etc. These stakeholders will pioneer the development of the innovations proposed in the project and will be instrumental as role models and agents of change for science institutions in Switzerland.

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7 Appendixes

7.1 List of all the interview partners

Title	Surname	First Name	Organisation group	Organisation	Function group	Function
Dr.	Ackermann[*5]	Sonia	Swissuniversities / SUC	Universität Basel	SUC Project	Projekt nationale Kennzahlen Forschung
Prof. Dr.	Baumann	Martin	University	Universität Luzern	Research	Prorektor Forschung und Leiter der Forschungskommission, Universität Luzern
Dr.	Buvelot Frei[*2]	Stéphanie	Funding Agancy	Krebsliga	Research	Wissenschaftliche Mitarbeiterin Forschungsförderung
Miss	Carlino	Cristina	Scientific infrastructure & associations	Hochschule für Technik und Wirtschaft (HTW) Chur	Library/Open Access	Leiterin Bibliothek
Mister	Claivaz	Jean-Blaise	Scientific infrastructure & associations	Universität Genf/Université de Genève	Library/Open Access	Coordinateur du pôle Publications et Open access
Dr.	Crausaz Esseiva	Anne	Swissuniversities / SUC	Swissuniversities	SUC Project	Bereichsleiterin Forschung und Entwicklung
Prof.	Desvergne	Béatrice	Research Hospital	Centre hospitalier universitaire vaudois	Research	Cheffe de département de la formation et recherche
Mister	Dietlicher[*3]	Roland	Swissuniversities / SUC	ETH Zürich	SUC Project	Programmleiter
Dr.	Dudler	Andreas	Scientific infrastructure & associations	switch	Management	Geschäftsführer
Dr.	Eichinger[*1]	Bernd	University of Applied Sciences	Fachhochschulen Nordwest Schweiz	Management	Leiter Hochschulentwicklungsprojekte
Prof. Dr.	Fuhrer	Christian	Scientific infrastructure & associations	Universität Zürich	Library/Open Access	Leiter Open Access, Hauptbibliothek Universität Zürich
Dr.	Furrer	Patrick	University of Applied Sciences	Fachhochschule Westschweiz/Haute école spécialisée de Suisse occidentale	Research	Vice-recteur Recherche et Innovation
Mister	Gonin	Marc-André	University of Applied Sciences	Berner Fachhochschule	Research	Präsident Forschungskommission
Dr.	Hägele[*5]	Bernd	Swissuniversities / SUC	Universität Basel	SUC Project	SUC P3 - Initiative "Forschungsevaluation in der Rechtswissenschaft“/Ko-Leiter Ressort Forschung
Dr.	Hasgall	Alexander	Swissuniversities / SUC	Universität Genf/Université de Genève	SUC Project	Programme "Performance de la recherche en sciences humaines et sociales" - CRUS. Coordinateur scientifique

Mister	Herb	Ulrich	Foreign expert	Universität des Saarlandes	Library/Open Access	Leiter Elektronische Publikationsangebote
Miss	Hirschmann	Barbara	Scientific infrastructure & associations	Eidgenössische Technische Hochschule (ETH) Zürich	Library/Open Access	E-Publishing Office, ETH-Bibliothek
Prof. Dr.	Horisberger	Roland	Research institute	Paul Scherrer Institut (PSI)	Research	Leiter Forschungskommission
Prof. Dr.	Hornborstel	Stefan	Foreign expert	Institut für Forschungsinformation und Qualitätssicherung	Research	Leiter des Institut für Forschungsinformation und Qualitätssicherung
Prof. Dr.	Jenny	Titus Andreas	University	Universität Freiburg/Université de Fribourg	Research	Vizerektor Forschung
Dr.	Keller	Alice	Scientific infrastructure & associations	Universität Zürich	Library/Open Access	Chefbibliothekarin
Mister	Kirstein*4	Andreas	Scientific infrastructure & associations	Eidgenössische Technische Hochschule (ETH) Zürich	Library/Open Access	Stellvertretender Direktor ETH-Bibliothek
Dr.	Kissling-Näf	Ingrid	Funding Agency	Schweizer Nationalfonds / Schweizerische Akademie der Geistes- und Sozialwissenschaften SAGW	Management	Leiterin Abteilung Geistes- und Sozialwissenschaften des Schweizerischen Nationalfonds
Dr.	Lepori	Benedetto	Funding Agency	Università della Svizzera italiana	Research	Verantwortliche für Research Service USI/SUPSI
Dr.	Lichtensteiger	Thomas	Research institute	EAWAG	Management	Leiter Stab
Prof. Dr.	Lienhard	Andreas	Swissuniversities / SUC	Universität Bern	SUC Project	Hauptverantwortlicher SUC P3 - Initiative "Forschungsevaluation in der Rechtswissenschaft“ / Geschäftsführender Direktor Kompetenzzentrum für Public Management
Dr.	Marti*2	Rolf	Funding Agency	Krebsliga	Research	Leiter Forschung, Innovation & Entwicklung, Mitglied der Geschäftsleitung
Prof.	Moreillon	Philippe	University	Universität Lausanne/Université de Lausanne	Research	Vice-Recteur Recherche et Relations Internationales
Mister	Moreira	Miguel	Scientific infrastructure & associations	RERO - Réseau des Bibliothèques de Suisse occidentale	Management	Deputy Director at RERO
Prof.	Mortensen	Andreas	University	ETH Lausanne/Ecole polytechnique fédérale de Lausanne	Research	Head of Research Office École polytechnique fédérale de Lausanne

Dr.	Nunnenmacher	Lothar	Scientific infrastructure & associations	Lib4RI - Library for the Research Institutes within the ETH Domain: Eawag, Empa, PSI &WSL	Library/Open Access	Leiter des Lib4RI
Prof. Dr.	Pekarek Doehler	Simona	University	Universität Neuenburg/Université de Neuchâtel	Research	Vice-rectrice Recherche et Qualité
Prof.	Ravano	Giambattista	University of Applied Sciences	Scuola universitaria professionale della Svizzera italiana	Research	Leiter Forschung und Innovation
Dr.	Regner*4	Franziska	Scientific infrastructure & associations	Eidgenössische Technische Hochschule (ETH) Zürich	Research	Leiterin Innovation und Entwicklung ETH-Bibliothek
Dr.	Sabo	Müfit	Scientific infrastructure & associations	Staatssekretariat für Bildung, Forschung und Innovation SBFI	Research	Chef de l'unité Bases Scientifiques
Prof. Dr.	Schedler	Kuno	University	Universität St.Gallen	Research	Prorektor Foschung
Miss	Schneider*3	Gabi	Swissuniversities / SUC	Universitätsbibliothek Basel	SUC Project	Stellvertretende Programmleiterin
Prof. Dr.	Schüpbach*1	Heinz	University of Applied Sciences	Fachhochschulen Nordwest Schweiz	Research	Direktor Hochschule für Angewandte Psychologie / Leiter Ressort Forschung
Dr.	Spescha	Georg	Research institute	EMPA	Research	Geschäftsführer Forschungskommission
Dr.	Verdicchio	Dirk	Scientific infrastructure & associations	Universität Bern	Library/Open Access	Koordinationsstelle Open Access
Prof.	Walker	Josef	University of Applied Sciences	Hochschule für Technik und Wirtschaft (HTW) Chur	Research	FHO-Forschung und Entwicklung
Dr.	Wirth	Katja	Funding Agency	Euresearch	Management	Member of the Management Board at Euresearch
Dr.	Zika	Ulrike	University of Applied Sciences	Hochschule Luzern	Research	Leiterin Ressort Forschung & Entwicklung
Prof. Dr.	Zünd	Gregor	Research Hospital	Universitätsspital Zürich	Research	Direktor Forschung & Lehre
Dr.	Zürcher	Markus	Scientific infrastructure & associations	Schweizerische Akademie der Geistes- und Sozialwissenschaften	Management	Generalsekretär der Akademie

*[i]: Double-Interview Groups

7.2 Original questionnaire used

SYMPHONY Umfrageleitfaden

Einleitung: Fragen zur Person

Vielen Dank, dass Sie sich für dieses Experteninterview Zeit nehmen!
Zuerst möchte ich eine kurze Einleitung geben zum Projekt, zur Auswertung des Interviews und zu den Themen, die wir besprechen möchten:

Projekt

Dieses Experteninterview ist Teil eines Forschungsprojekts an der HTW Chur, das den Titel trägt:

„SYMPHONY – Swiss system for monitoring bibliographic data and holistic publication behavior analysis: Requirements Analysis“

Das Projekt wird finanziert von swissuniversities. (Laufzeit: 1. 9. 2014 bis 30. 6. 2015).

Auswertung des Interviews

Sofern Sie damit einverstanden sind, würden wir gerne dieses Interview auf Tonband aufnehmen. Ihre Angaben werden aber selbstverständlich streng vertraulich und nur in anonymisierter Form ausgewertet. Wir werden in der Auswertung eventuelle wörtliche Zitate aus den Interviews verwenden, aber alle Angaben entfernen, welche Rückschlüsse auf bestimmte Personen oder Organisationen ermöglichen.

Wenn Sie damit einverstanden sind, würden wir gern Ihren Namen und Ihre Organisation im Anhang erwähnen. Das erhöhte die Glaubwürdigkeit der Resultate, ohne dass dadurch die Anonymität verletzt wird.

Durch das Experteninterview möchten wir von Ihrem Wissen und Ihren Kenntnissen profitieren. Bei bestimmten Fragen gibt es vermutlich kein gesichertes Wissen. In diesem Fall sind wir froh, wenn Sie uns dennoch eine Antwort geben können, die ihrer subjektiven Einschätzung und Meinung entspricht.

Das Interview dauert ca. 40‘.

1. **Persönlicher Bezug zur Thematik**

   Bevor wir zum allgemeinen Teil des Interviews kommen möchte ich Sie fragen:

- Welchen Bezug haben Sie in Ihrer aktuellen beruflichen Funktion zur Thematik?
- Messung des Outputs von Wissenschaftlerinnen?

26. Thema: Aktuelle Praxis der Messung des Outputs von Wissenschaftlerinnen und Wissenschaftlern

27.

2. **Anlässe der Forschungsleistungsmessung**
   Nun zu Ihrer Organisation [Namen nennen].

   Wir interessieren uns dafür, wie an Ihrer Organisation die wissenschaftlichen Leistungen der Mitarbeiterinnen und Mitarbeiter gemessen werden.

   - Im Rahmen von welchen Anlässen werden in Ihrer Institution Daten zur Messung der Forschungsleistung erhoben und ausgewertet?
   - Bitte nennen Sie uns alle Anlässe, die es dafür gibt.

3. **Verwendungszwecke**
   [Liste 1: Verwendungszwecke vorlegen]
   - Wie wichtig sind in Ihrer Organisation die folgenden Verwendungszwecke für die erhobenen Daten?
   - Ich gebe Ihnen eine Liste mit möglichen Verwendungszwecken, aber weitere sind selbstverständlich möglich.

4. **Wichtigkeit von verschiedenen Indikatoren**
   [Liste 2: Indikatoren vorlegen]
   - Können Sie uns sagen, wie wichtig in Ihrer Organisation die folgenden Formen der Messung von Forschungsleistungen sind?
   - Ich lege Ihnen als Anregung auch hierfür eine Liste mit Indikatoren vor, die in der Literatur diskutiert werden.

5. **Indikatoren**

   Wie wurde bei Ihnen darüber entschieden, die gerade erwähnten Indikatoren für die Messung der Forschungsleistung zu verwenden?

6. Hat Ihre Organisation früher einmal andere Formen der Wissenschaftsmessung verwendet? Wenn ja, wieso wurde diese aufgegeben?

   ◯ Nein
   ◯ Andere:

7. **Herausforderungen bei der Leistungsmessung in Form von Publikationen**
   - Wo bestehen aus Ihrer Perspektive die grössten Herausforderungen bei der Leistungsmessung in Form von Publikationen?

8. **Barrieren für Open Access**

   [Liste 3: Barrieren zu Open Access vorlegen.]
   - Erkennen Sie in Ihrer Organisation Barrieren, die einer Publikation von Texten als Open Access oder als Closed Access im Wege stehen?
   - Auch hierfür habe ich als Anregung eine Liste von möglichen Barrieren, die in der Literatur diskutiert werden.

9. **Publikationsrythmus**
   - Wie oft publizieren Ihre Forschenden normalerweise?
   - Wie lange sind diese Beiträge im Durchschnitt?

10. Gibt es einen grossen Druck, zu publizieren und Reputation aufzubauen?

	1	*2*	*3*	*4*	*5*	
Ja, es gibt einen grossen Druck	◯	◯	◯	◯	◯	Nein, es gibt keinen Druck

11. Wird sich dies in Zukunft verändern, und wenn ja, in welche Richtung?

12. **Publikationspolicies**
    !! [Nur bei übergreifenden Organisationen]
    [Wenn möglich, die Policies etc. dokumentieren, erfragen]
    - Hat Ihre Organisation bestimmte Vorschriften, Policies oder ähnliches, die versuchen, auf die Publikationstätigkeiten Ihrer Forschenden Einfluss zu nehmen?
    - Falls ja, wie sehen diese konkret aus?

28. Thema: Bibliometrie und Altmetrics

In unserem Projekt interessieren wir uns auch dafür, ob sich andere Systeme für die Messung wissenschaftlicher Leistung aufbauen lassen können.

13. Bibliometrie oder auch Zitationsanalyse wird heute vor allem für die Messung wissenschaftlicher Leistungen genutzt.
- Kennen Sie diesen Begriff?

[Bei Antwort "Nein", nächste Frage überspringen.]

14. Gibt es in Ihrer Organisation eine interne Diskussion und Auseinandersetzung zum Thema Bibliometrie?
- Falls ja, welche Punkte werden da diskutiert?

15. [Liste 4: Bibliometrie vorlegen.]
- Was ist Ihre Meinung zu den folgenden Anwendungsmöglichkeiten der Bibliometrie?
- Als wie sinnvoll betrachten Sie diese?

16. Unter dem Begriff „Altmetrics“ werden verschiedene andere Methoden zusammengefasst, mit denen Publikationsleistungen erfasst werden können.
- Kennen Sie diesen Begriff?

[Bei Antwort "Nein", die nächsten zwei Fragen überspringen.]

17. [Liste 5: Altmetrics vorlegen.]
- Was verstehen Sie unter Altmetrics?

18. Gibt es in Ihrer Organisation eine interne Diskussion und Auseinandersetzung zum Thema Altmetrics?
- Falls ja, welche Punkte werden da diskutiert?

29. Anforderungen an ein neues System

19. Wie gesagt untersuchen wir in unserem Projekt, ob ein neues System der Messung von Wissenschaftsleistungen aufgebaut werden sollte.
- Aus Ihrer Position heraus, was sind die drei grössten Stärken und was sind die drei grössten Schwächen des Systems von Wissenschaftsmessung, das Sie bislang verwenden?

◯ Keine Angaben

20. 3 Schwächen

21. 3 Stärken

22. Wenn Sie die Möglichkeiten hätten, ein neues System zu entwerfen und sich dabei nicht um die Umsetzung zu kümmern bräuchten:
    - Welche Anforderungen müsste ein solches System erfüllen?
    - Bitte nennen Sie drei Anforderungen, die für Sie prioritär wären.

23. Sollte ein solches System mehr Publikationsformen abdecken, als Journalartikel, Bücher und Konferenzbeiträge?
    - Wenn ja, welche?

    ◯ Nein
    ◯ Ja:

24. [Bei Antwort "Nein", nächste Frage überspringen.]
- Wir haben uns im Rahmen des Projektes schon Gedanken zu technischen und organisatorischen Aspekten eines solchen Systems gemacht.
- Möchten Sie zur technischen und organisatorischen Gestaltung eines solchen Systems Stellung nehmen?

◯ Nein
◯ Ja:

25. [Liste 6: Technische und organisatorische Aspekte vorlegen]
- Wie wichtig wären Ihnen bei einem solchen System folgende Aspekte?

26. [Liste 7: mögliche Nutzung eines neuen Systems vorlegen.]
- Wofür würden Sie ein solches System nutzen?
- Welche Anwendungsfälle würden durch dieses System an Bedeutung gewinnen?
- Welche an Bedeutung verlieren?
- Bei welchen würde die Bedeutung gleich bleiben?

30. **Aussagen zu einem möglichen neuen System**

Bitte sagen Sie mir bei jeder Aussage, wie stark Sie dieser zustimmen oder ablehnen

Durch ein neues System für die Messung des Publikationsverhaltens von Forschenden…

27. …wird der zeitliche und finanzielle Aufwand, reduziert, der heute dafür notwendig ist.

	0	*1*	*2*	*3*	*4*	*5*	
0: kann ich nicht beurteilen *1: gar nicht einverstanden*	◯	◯	◯	◯	◯	◯	5: Sehr einverstanden

Durch ein neues System für die Messung des Publikationsverhaltens von Forschenden…

28. …werden die individuellen Leistungen von Forschenden umfassend dargestellt.

	0	*1*	*2*	*3*	*4*	*5*	
0: kann ich nicht beurteilen *1: gar nicht einverstanden*	◯	◯	◯	◯	◯	◯	5: Sehr einverstanden

Durch ein neues System für die Messung des Publikationsverhaltens von Forschenden…

29. …werden Unterschiede zwischen den wissenschaftlichen Disziplinen in einer angemessenen Form berücksichtigt

	0	*1*	*2*	*3*	*4*	*5*	
0: kann ich nicht beurteilen *1: gar nicht einverstanden*	◯	◯	◯	◯	◯	◯	5: Sehr einverstanden

Durch ein neues System für die Messung des Publikationsverhaltens von Forschenden…. …werden Grundlagen geschaffen für eine verbesserte Analyse des Publikationsverhaltens von Forschenden in der Schweiz.

	0	*1*	*2*	*3*	*4*	*5*	
0: kann ich nicht beurteilen *1: gar nicht einverstanden*	◯	◯	◯	◯	◯	◯	5: Sehr einverstanden

Durch ein neues System für die Messung des Publikationsverhaltens von Forschenden…

31. … werden Grundlagen geschaffen für eine verbesserte Steuerung des Wissenschaftssystems.

	0	*1*	*2*	*3*	*4*	*5*	
0: kann ich nicht beurteilen *1: gar nicht einverstanden*	◯	◯	◯	◯	◯	◯	5: Sehr einverstanden

32. **Abschlussfrage**
    - Damit sind wir schon fast am Schluss des Interviews angekommen, es folgen noch zwei Fragen zum Abschluss.
    - Gibt es von Ihrer Seite noch ein wichtiges Thema, das wir noch nicht angesprochen haben?
    - Möchten Sie noch eine Art Schlusswort oder eine Zusammenfassung ihrer Position zu dieser Thematik formulieren?

33. **Terminfrage**

Wie bereits erwähnt, möchten wir vorläufige Ergebnisse dieser Expertenbefragung an einem Workshop in Bern mit allen Beteiligten sowie weiteren Gästen diskutieren. Die folgenden Termine haben wir dafür vorgesehen. Können Sie mir bitte sagen, welcher dieser Termine für Sie möglich ist:

- ◯ Mittwoch, 10. Juni 10:15-14:00 Uhr
- ◯ Freitag, 12. Juni 10:15-14:00 Uhr
- ◯ Dienstag, 16. Juni 10:15-14:00 Uhr
- ◯ Freitag, 19. Juni 10:15-14:00 Uhr

Dank, Verabschiedung

Vielen Dank für das interessante Gespräch! Ich hoffe, dass wir uns am Workshop in Bern wieder sehen.

Liste 1: Verwendungszwecke

Wie wichtig sind in Ihrer Organisation die folgenden Verwendungszwecke für die erhobenen Daten?

- ◯ Forschungsleistung der Gesamtorganisation (z.B. Hochschule)
- ◯ Forschungsleistung von Teileinheiten der Organisation (z.B. bestimmte Institute)
- ◯ Forschungsleistung von einzelnen Forschenden
- ◯ Strategische Planung (Bsp. Aufbau von neuen Forschungsschwerpunkten)
- ◯ Publikationen für Stakeholdern (z.B. Jahresberichte, Berichte an Behörden etc.)
- ◯ Lobbying für die eigene Organisation (Bsp. Sponsoren)

Liste 2: Indikatoren

Können Sie uns sagen, wie wichtig in Ihrer Organisation die folgenden Formen der Messung von Forschungsleistungen sind?

Publikationsformen

- ◯ Anzahl Publikationen in Peer Reviewed Journals
- ◯ Anzahl Publikationen in Non-Peer Reviewed Journals
- ◯ Anzahl Buchkapitel
- ◯ Anzahl Bücher (Monographien, Herausgeberschaften etc.)
- ◯ Anzahl der Konferenzauftritte
- ◯ Gesamtanzahl der Publikationen (unabhängig vom Typ)
- ◯ Selbstpublikation ohne Peer Review (Bsp. Working Paper)
- ◯ Mikro-Publikationen (Bsp. Forschungsblog)
- ◯ Auftritte und Erwähnungen in sozialen Medien (Facebook, Snapchat, Twitter etc.)
- ◯ Software-Publikationen
- ◯ Publikation von Datenbanken und Datensätzen

Formen und Faktoren

- ◯ Impact Faktoren, und wenn ja, welche?
- ◯ Open Access Publikationen (in allen Formen)

Drittmittel

- ◯ Forschungsumsatz (in CHF)
- ◯ Anzahl Drittmittelprojekte in der Grundlagenforschung (Bsp. SNF, EU etc.)

◯ Anzahl Drittmittelprojekte in der angewandten Forschung (Bsp. KTI, Stiftungen, Unternehmen etc.)

Wissenschaftliche Community

◯ aktive Mitgliedschaft in Fachnetzwerken
◯ Interdisziplinarität von Forschungsprojekten
◯ Gutachtertätigkeit für Fachzeitschriften und Funding Agencies
◯ Einfluss auf die Fachcommunity
◯ Nationale Zusammenarbeit
◯ Internationale Zusammenarbeit

Öffentlichkeit

◯ Präsenz in Massenmedien (TV, Zeitungen etc.)
◯ Öffentliche Vorträge
◯ Anfragen für Gutachten von Behörden und Unternehmen

Liste 3: Barrieren zu Open Access

Erkennen Sie in Ihrer Organisation Barrieren, die einer Publikation von Texten als Open Access oder als Closed Access im Wege stehen?

◯ Die Forschenden sehen Open Access nicht als wichtig an
◯ Die Forschenden sind der Meinung, Publikationen in Open Access würden ihrer Reputation schaden
◯ Die Forschenden haben sich mit Open Access nicht auseinandergesetzt
◯ Die Forschenden kennen keine Orte, um in Open Access zu publizieren
◯ Unsere Organisation hat keine Infrastruktur, um Open Access zu unterstützen (z.B. Open Access Büro)
◯ Die Kosten für die Publikation in Open Access sind zu hoch

Liste 4: Bibliometrie

Was ist Ihre Meinung zu den folgenden Anwendungsmöglichkeiten der Bibliometrie?

◯ Bibliometrie als Methode zur Messung und Vergleich von wissenschaftlichen Leistungen
◯ Bibliometrie als Methode, um Einflussnetzwerke von Forschenden zu untersuchen
◯ Bibliometrie als Methode, um die Entwicklung von Wissenschaft zu untersuchen

Liste 5: Altmetrics

Was verstehen Sie unter Altmetrics?

- ◯ Graue Literatur, die im Internet publiziert wird
- ◯ Open Access Zeitschriften, die nicht im Web of Science enthalten sind
- ◯ Erwähnungen von wissenschaftlichen Arbeiten auf Sozialen Medien wie Twitter, Facebook, etc.

Liste 6: Technische und organisatorische Aspekte

Wie wichtig wären Ihnen bei einem solchen System folgende Aspekte?

Datenqualität

- ◯ Automatisches Auslesen von Daten aus Repositories und von institutionellen Webseiten (im Regelfall keine manuelle Dateneingabe notwendig)
- ◯ Möglichkeit zur Eingabe und Kontrolle auf Daten durch Forschende
- ◯ Möglichkeit zur Eingabe und Kontrolle der Daten durch Ihre Institution

Datenaktualität

- ◯ Frequenz der Datenaktualisierung (monatlich, jährlich, kontinuierlich etc.)

Zugriff auf Daten und Statistiken

- ◯ Rohdaten als Linked Data
- ◯ Zugriff über eine Web Applikation auf schon bearbeitete Daten
- ◯ Integration von Daten aus anderen bibliometrischen Systemen (z.B. Journal Impact Factor)
- ◯ Automatische Einbindung in Jahresberichte, Webseiten der Institution und/oder Forschenden

Analysemöglichkeiten

- ◯ Eigenfactor, h-Index u.a.
- ◯ Benutzerdefinierte Analysemöglichkeiten (z.B. Gewichtung von Publikationen, Outlets etc.)
- ◯ Gewichtung unterschiedlicher Publikationsformen, u.a. nicht-traditionelle (z.B. Blogs, Soziale Netzwerke)

Open Access

◯ Möglichkeit, Open Access spezifisch anzuzeigen / in die Bewertung einzubeziehen

Betrieb

◯ Das System soll ohne Zusatzausbildung eingesetzt werden können
◯ Verfügbarkeit eines Supports bei Unklarheiten
◯ Das Service soll von einer zentralen Stelle betrieben werden
◯ Es sollen Schulungen zu dem System angeboten werden

Liste 7: mögliche Nutzung eines neuen Systems

Wofür würden Sie ein solches System nutzen?
Welche Anwendungsfälle würden durch dieses System an Bedeutung gewinnen?
Welche an Bedeutung verlieren?
Bei welchen würde die Bedeutung gleich bleiben?

+	**0**	Bewertung der Forschungsleistung der Gesamtorganisation (z.B. Hochschule)
-		
+	**0**	Bewertung der Forschungsleistung von Teileinheiten der Organisation (z.B. bestimmte In-
-		stitute)
+	**0**	Bewertung der Forschungsleistung von einzelnen Forschenden
-		
+	**0**	Strategische Planung der Organisation (z.B.
-		
+	**0**	Publikation gegenüber Stakeholdern (z.B. Jahresberichte, Berichte an die Regierung etc.)
-		
+	**0**	Lobbying für die Organisation
-		

7.3 Presentation slides from workshop in Bern

HTW Chur
Schweizerisches Institut für Informationswissenschaft

SYMPHONY –Swiss system for monitoring bibliographic data and holistic publication behavior analysis: Requirements Analysis

Workshop on June 12, 2015 Bern

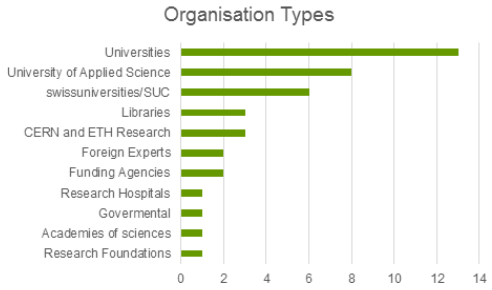
Project team:
Prof. Dr. Urs Dahinden
Prof. Dr. Albert Weichselbraun
Dr. Karsten Schuldt,
MSc Vincenzo Francolino,
BSc Fabian Odoni
BA Julia Rippstein
FHO Fachhochschule Ostschweiz

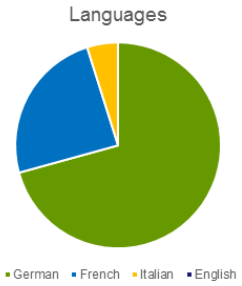
Program of the workshop

Time	Topic	Responsibility
9:15	Welcome	R. Dietlicher
9:20	Introduction	U. Dahinden
9:25	Results of the expert interviews	F. Odoni
10:05	Scenarios: Symphony Development	A. Weichselbraun
10:30	Coffee Break	
10:50	Discussion of Scenarios	all (moderated by U. Dahinden)
11:40	Next steps: Follow-up project Symphony	A. Weichselbraun
12:00	End of workshop, lunch	all

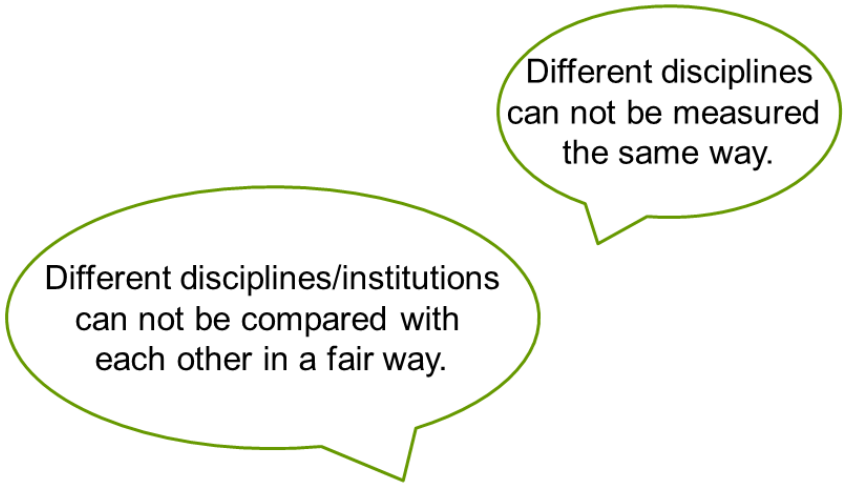
Research Method

- Interviews with specialists and stakeholders
  - Goal: 40-45 interviews
  - Conducted and evaluated at this point: 31 (=n)
- High participation rate: 41 Interviews with 45 persons (4 interviews with 2 persons)





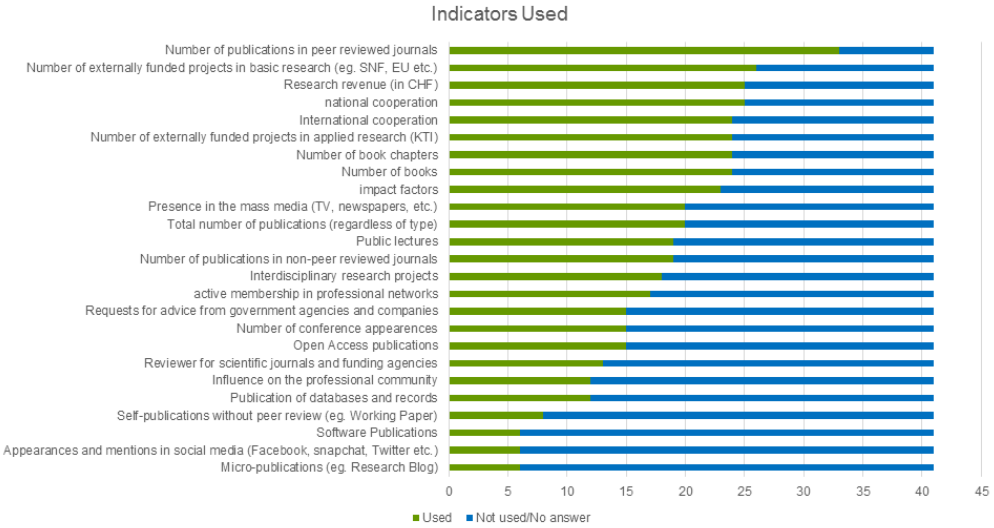
Preliminary Interview Results



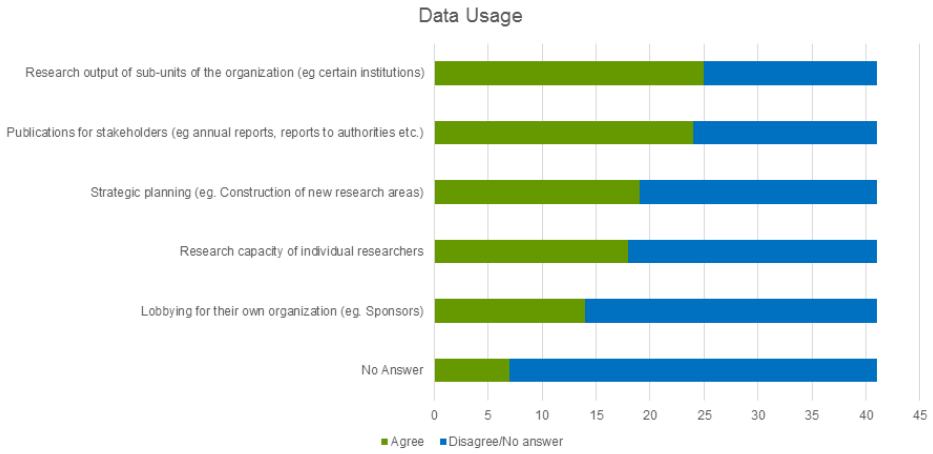
Preliminary Interview Results

Why is data being collected?

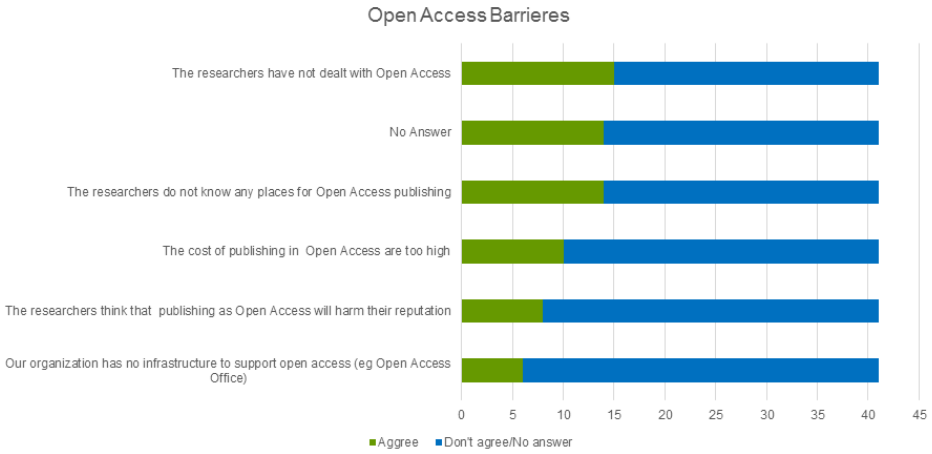
Preliminary Interview Results



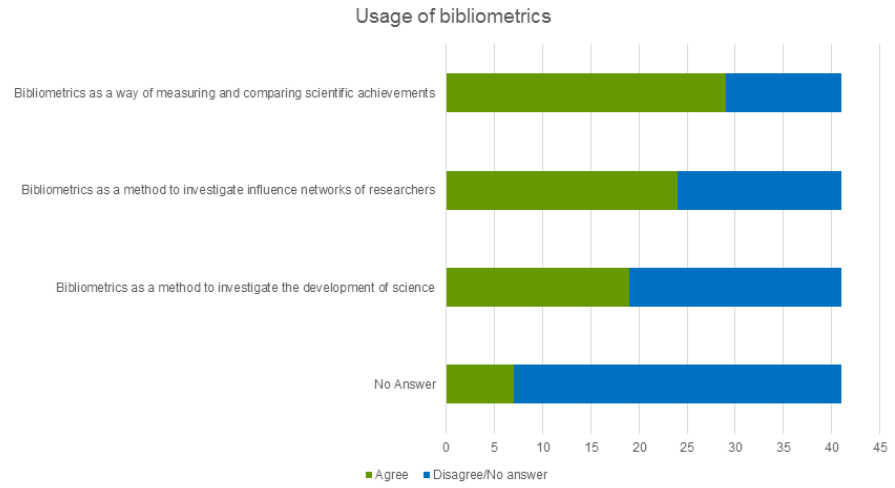
Preliminary Interview Results



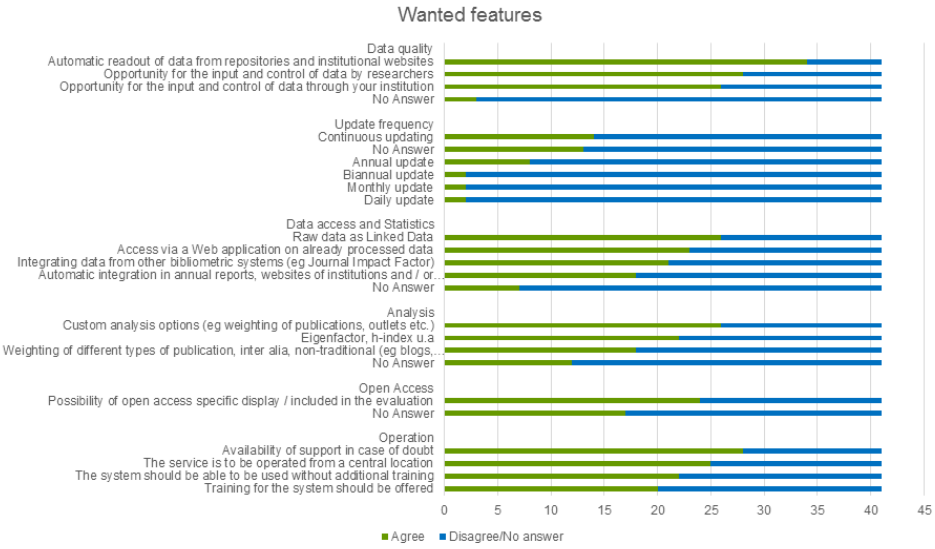
Preliminary Interview Results



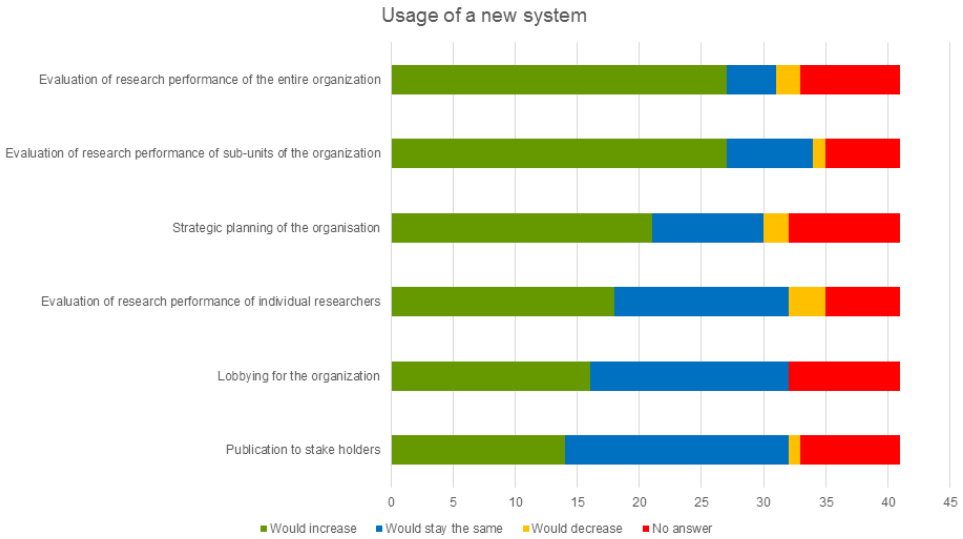
Preliminary Interview Results



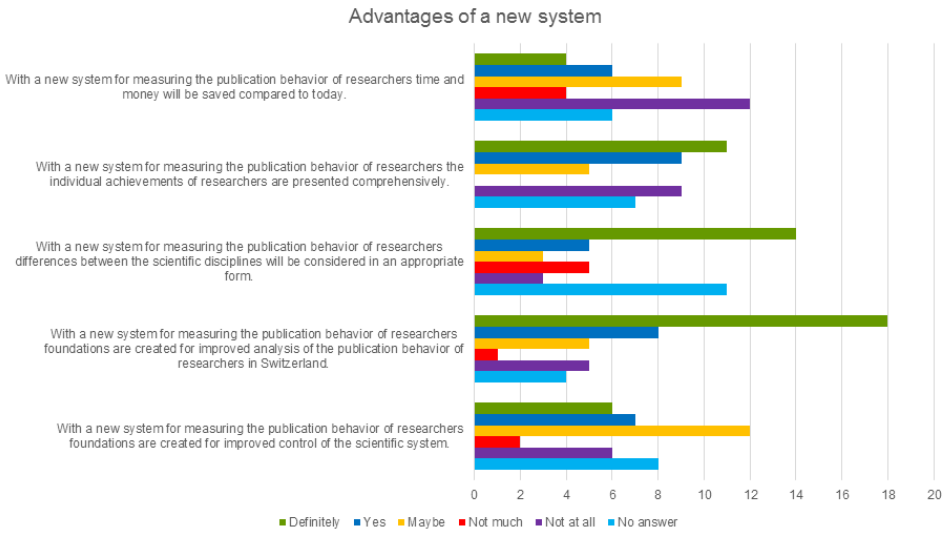
Preliminary Interview Results



Preliminary Interview Results



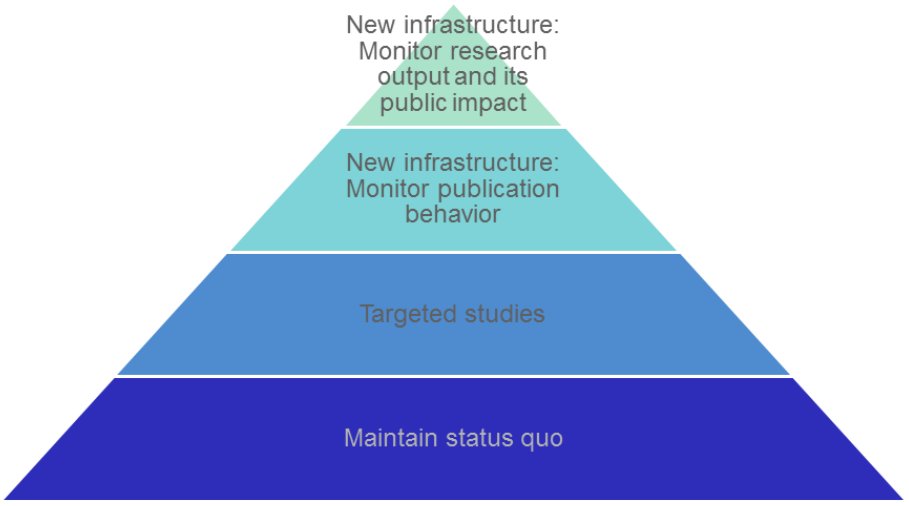
Preliminary Interview Results



Scenarios – Overview

#	Scenario	Comments
1	Maintain status quo	Organizations perform their own studies; no information on OA
2	Targeted studies	Easy to adapt to scientific disciplines Obtaining data on publications is very cost intensive (unless the Web of Science is used).
3	New infrastructure: Monitor publication behavior	Extends (2) and integrates publicly available data (repositories, academic social networks). Allows qualitative and aggregated quantitative studies. Should be combined with targeted studies
4	New infrastructure: Monitor research output and its public impact	Extends (3) with means to measure the public impact of publications.

Scenario - Pyramide



Scenarios 1 – Maintain status quo

Implementation

- Studies performed by external partners to assess the **scientific performance** (!= publication behavior, topics, trends) of Swiss researchers

Benefits

- Well defined process
- High acceptance in some disciplines
- Internationally established values and results

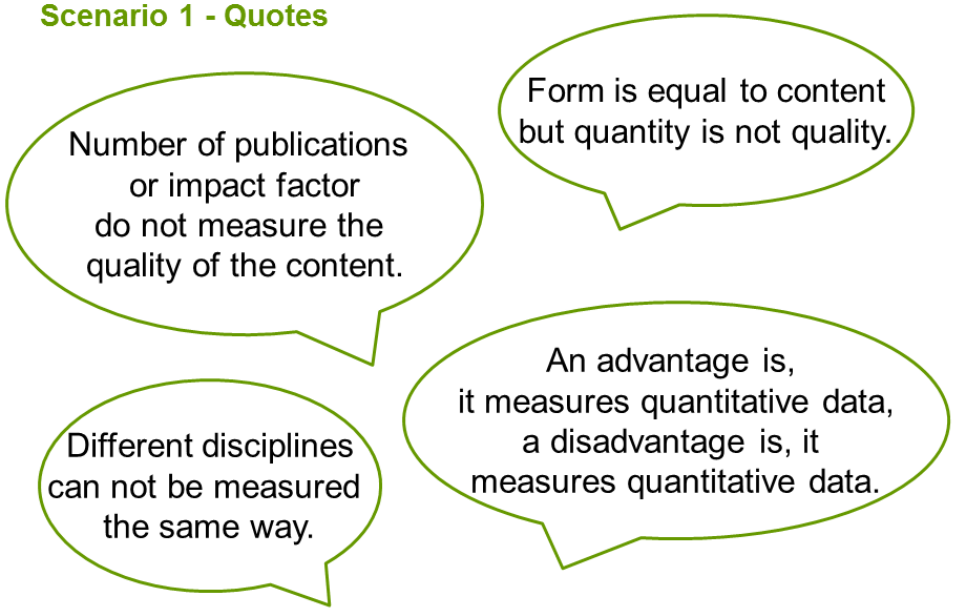
Problems

- Data acquisition problematic and cost intensive
  → draw upon the Web of Science (SCI)
- No or limited coverage of collaboration networks, publication outlets (conferences journals, OA), trends, temporal effects
- Does not consider and/or investigate structural differences between disciplines and organizations

Data sources:

- Web of Science
- Questionnaires

Scenario 1 - Quotes



Scenarios 2 – Targeted studies: specific disciplines, universities and methods

Implementation

- Perform further regular targeted studies
- For example the initiatives of the SUC P3 „Performance de la recherche en sciences humaines et sociales“ (limited to 2016)
  - Developing indicators for the usage of research in Communication Sciences
  - Der Wertbeitrag betriebswirtschaftlicher Forschung
  - Scientometrics 2.0: Wissenschaftliche Reputation und Vernetzung
  - Forschungsevaluation in der Rechtswissenschaft
  - Ressourcen-basiertes Instrument zur Abbildung geisteswissenschaftlicher Forschung am Beispiel der Theologie
  - Cartographier les réseaux de recherche. Interactions et partenariats en sciences humaines et sociales
  - National vergleichbare Daten für die Darstellung und Beurteilung von Forschungsleistungen“

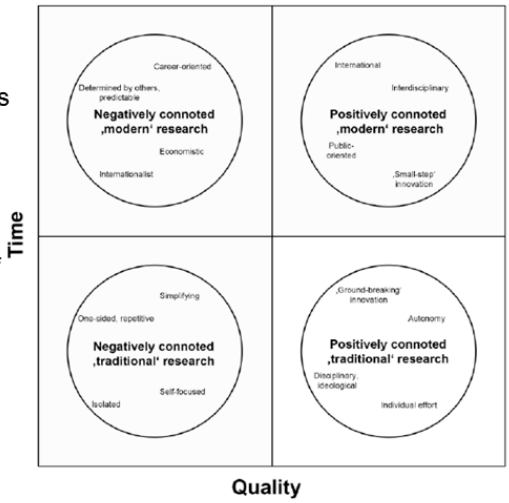
Scenarios 2 – Targeted studies: specific disciplines, universities and methods

Implementation

- Complemented by social studies such as CERN: Open access study (questionnaires)

Benefits

- Detailed and in-depth studies of individual disciplines
- One example: Typologies of research assessment criteria based on a Delphi survey



Source of the figure: Ochsner, M.; Hug, S. E.; Daniel, H.-D. (2012): Four types of research in the humanities: Setting the stage for research quality criteria in the humanities. In: *Research Evaluation. DOI:* 10.1093/reseval/rvs039.

Scenarios 2 – Targeted studies: specific disciplines, universities and methods

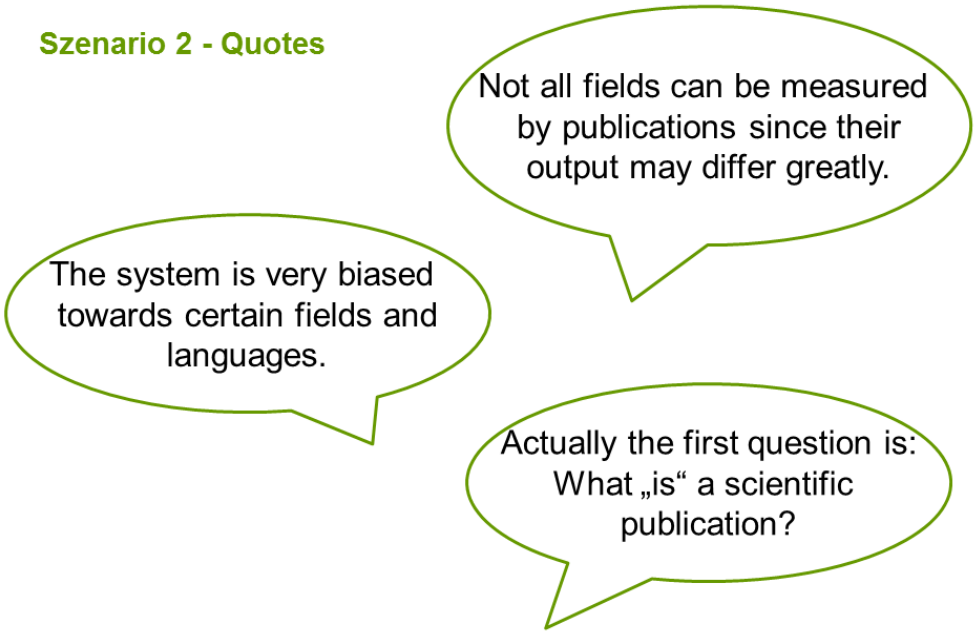
Problems

- No integration of data perspectives across disciplines
- Does not support secondary data analysis (lack of standardized data, no open access to data)
- High effort necessary due to the specialized methodology for each discipline
- Grounding in bibliographic data often missing (cost intensive)
- Missing continuity (end of the program P3 in 2016)

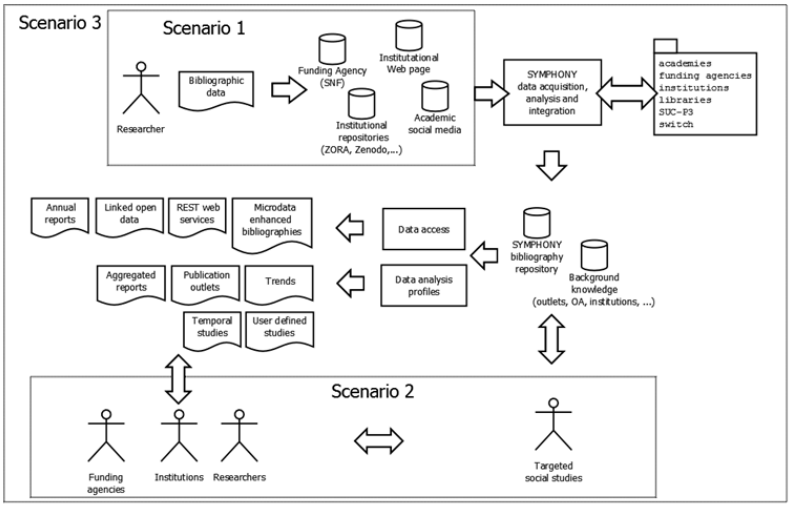
Data sources:

- Web of Science
- Questionnaires
- Bibliographies (small samples or cost intensive)

Szenario 2 - Quotes



Scenarios 3 – Infrastructure: Monitor publication behavior



Scenarios 3 – Infrastructure: Monitor publication behavior

Implementation

- Obtain and integrate bibliographic data from publicly available resources
  - Institutional repositories (ZORA, BORIS, LORY, …)
  - Web: Scientific social media (Research Gate, Mendeley, Zotero, …)

  → addresses the data problem
- Provides the data base for *user-driven* and *user-oriented* analyses of the publication behavior.
- Support for qualitative and aggregated quantitative analysis
  - Collaborations between people, organizations and disciplines
  - Importance of outlets, topics
  - Temporal studies
  - Trend analysis (OA, conferences, journals, topics)
- Annotate publications and outlets with custom meta data
  - Mark OA journals, OA publications, OA fees
  - Funding agency, project, budget, etc.
  - Custom groupings for analysis

Scenarios 3 – Infrastructure: Monitor publication behavior

Benefits

- Data integration component: Collects and integrates bilbiographic information
  - Provides a single point to access and analyze this information
  - Automatic data acquisition to minimize the required manual effort
  - Options to export and reuse this data (Bibliographies + Microformats, Linked Open Data, iFrames, etc.)
  - Provides data on outlets (journals, conferences, etc.)
- Bottom up
  - Completeness - all scholarly publications and other results from research are included
  - Transparency: every institution can see and check all other instiution's data. The database is also online and open to society at large.
  - Multiple use of data: cv's, applications, evaluations, annual reports, internal administration, bibliography for open archives, links to full text, etc.
- Data access and annotation component:
  - Allows user-oriented annotations on different levels (outlets, publications, institutions, departments)
  - Examples: information on open access journals and publications

Scenarios 3 – Infrastructure: Monitor publication behavior

Benefits

- Data analysis component
  - Allows user-oriented analyses which consider differences between disciplines and organizations
  - Fair analytics and visualizations of achievements within disciplines and organizations
  - Optional benchmarking of disciplines and organizations
  - Example analysis:
    - Collaboration networks
    - Importance of publication types (open access)
    - Quantitative studies
    - Temporal analysis
    - Research profiles (spidergraph plots)
    - Trend analysis (based on the publication titles and keywords)
  - Supports custom studies → user defined groups and criteria
  - Provides bibliographic data in an open format, accessible to all interested parties (LOD, SPARQL)

Scenarios 3 – Infrastructure: Monitor publication behavior

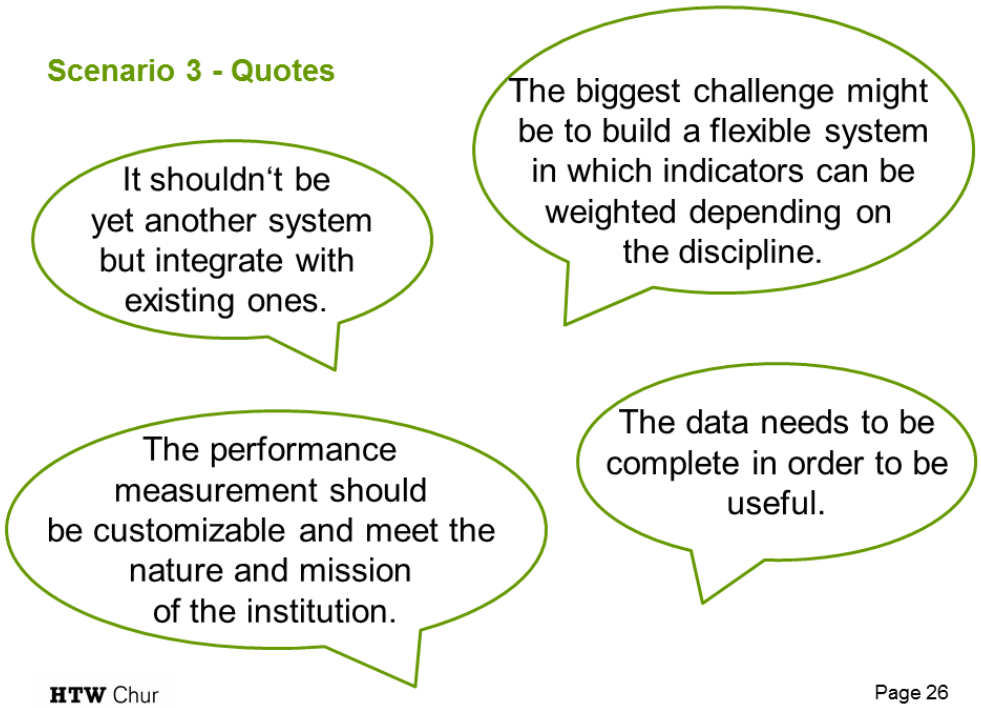
Problems

- Comparability with other nations requires additional efforts
- Integration of heterogeneous data sources → maintenance
- Coordination with multiple stakeholders

Data sources

- Bibliographic data obtained from previously discussed resources
- Weights and preferences defined by disciplines and organisations

Scenario 3 - Quotes



Benefits of Scenario 3

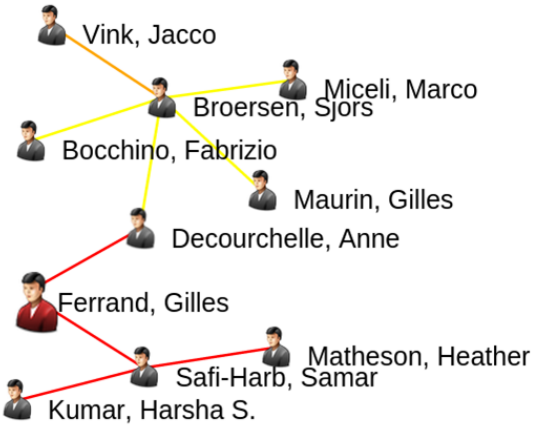


 Image Source: vici: Visualization of Collaboration on inspirehep.net

Benefits of Scenario 3: Profiles of research units by topics ()

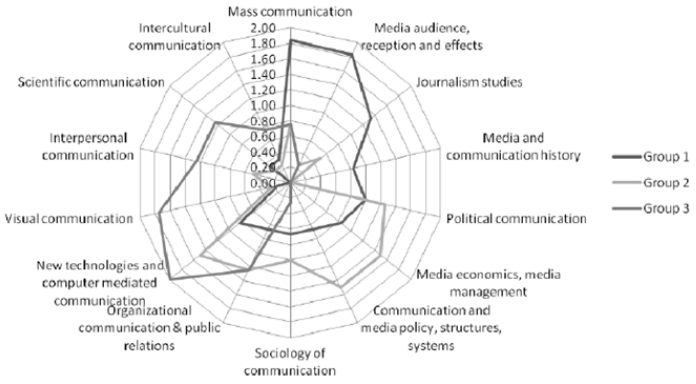


 Image Source: Source of the figure: Lepori et al (2011) Measuring Research Output in the Swiss communication sciences: 57

Benefits of Scenario 3

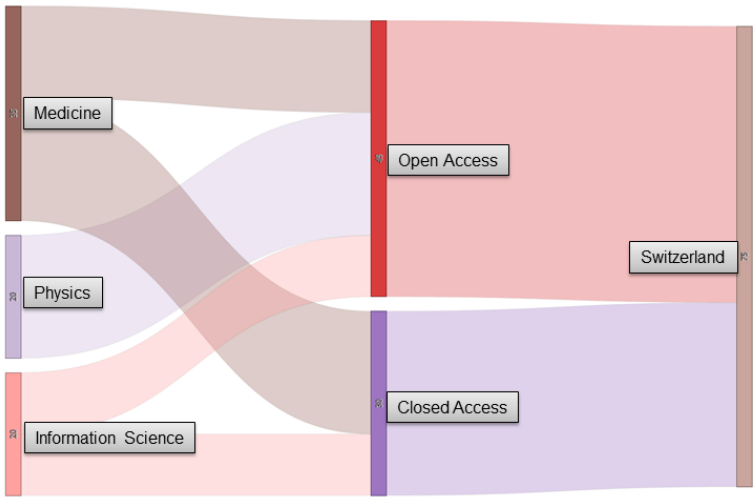


 Image Source: http://sankey.csaladen.es/ (made with fictitious data)

Benefits of Scenario 3

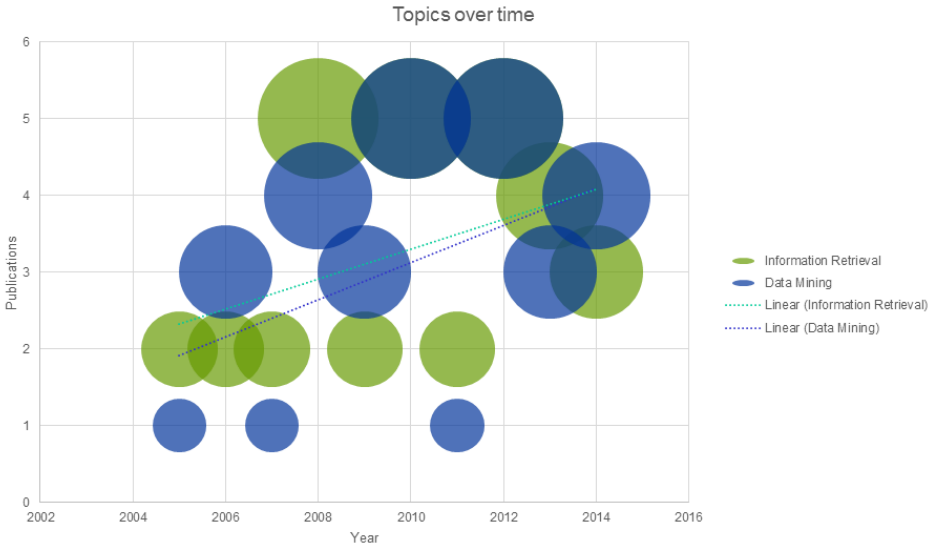


 Image Source: Made with excel and random numbers

Scenarios 4 – Infrastructure: Monitor research output and its public impact

Implementation

- Additional support for monitoring media and social media sources for mentions of research projects, scientists and research institutions.
  - Number of mentions (frequencies)
  - Sentiment
  - Topics associated with these entities

Benefits

- Contrast media coverage with scientific coverage (compare ARCP project for climate change)
- Foster a dialogue between the scientific community and the public
- Promote a more active role of science in public discussions

→ high visibility and acceptance

- Compare an organization's research profile to its public perception

Scenarios 4 – Infrastructure: Monitor research output and its public impact

Benefits

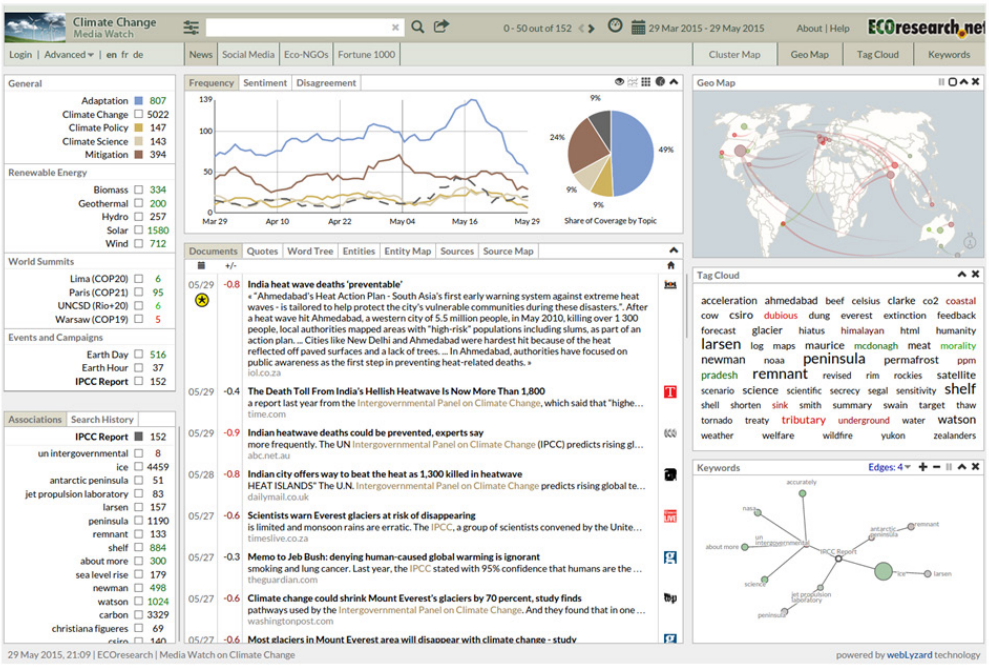
- Dialogue with the public
  → Public goodwill and acceptance
- Controversies around scientific research
- Perception and public image of science, scientific organizations and funding agencies
- Topics → Trends, etc. (in respect to the public coverage)

Problems

- Higher complexity
- Maintenance and cost

Additional data sources

- News media
- Social media



Scenario 4 - Quotes

What is quality? Also, bad work can be cited often even or because it is bad.

How can we measure the value of scientific work? We need to know what impact it had on the population.

How to reduce complexity and risks of scenarios 3 and 4

- Early cooperation with SWITCH
- Start with a limited coverage in terms of
  - data sources
  - disciplines
  - potentially with SUC-P3
- Early incorporation of libraries as partners
- Establishment of a Bibliometrics Center Chur
- Complement technical approaches with social studies to customize analysis and meta data to organizations and disciplines.

Fulfillment of requirements

Requirement (importance) Scenario →	1	2	3	4
1. Provides comprehensive information on OA	~	~	✓	✓
2. User-oriented, consider differences between disciplines	~	✓	✓	✓
3. User-defined analysis (OA, temporal, trends, …)	-	-	✓	✓
4. Consider other publication indicators (OA, Eigenfactor, …)	~	~	✓	✓
5. Automatic data acquisition, minimize manual effort	-	-	✓	✓
6. User-defined groups (e.g. project, department, …)	-	-	✓	✓
7. System needs to be transparent, well defined metrics	✓	✓	✓	✓
8. Provide read access and means to correct data & interop.	-	-	✓	✓
9. Include other indicators of research performance	-	~	✓	✓
A. Provide means for estimating social relevance	-	-	-	✓
B. Integrate other factors (teaching, administration, ...)	-	-	-	-

Discussion

- The 4 different scenarios can now be evaluated

- Evaluation will be conducted using different colored cards
  - Green: I like it, because…
  - Red: I dislike it, because…
  - White: Thoughts, suggestions, questions

- Please feel free to also engage in discussions among each other

Next steps:

- Finalizing Symphony requirements analysis
  - Complete data analysis and combine with workshop results
  - Finish final report and distribute pre-print to project participants
- End of Symphony Requirements Analysis

Different levels of support

Letter of support

- Stay informed about project status and events
- Do not receive financial support
- Optional participation on the project board

Different levels of support

Letter of Intent

- Active role within the project (time, know-how, data, …)
  - Repositories → open APIs and data interfaces
  - Academies → support of their members, define use cases
  - Universities / Universities of applied sciences / research organizations → define use cases
  - Funding agencies → define common use cases
  - Scientific libraries

- Explicite inclusion in the project application to fund these activities
- Recommended: Participation on the project board

Questions and Comments?

Thank you for your attention.