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THE SCOPE OF OPEN SCIENCE MONITORING AND GREY LITERATURE

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Abstract

One European research policy is to foster open science. The Open Science Monitor has been created as one particular source among many addressed before the European Commission makes proposals for policy in cooperation with Member States of the EU and stakeholders. The purpose of this paper is to assess the real and potential place of grey literature in the EC Open Science Monitor, in their data sources, in their methodology and indicators, in published surveys and case studies, etc. Additionally, as the creation of a monitoring system is among the objectives of the new French National Plan for Open Science, the paper provides comparative information about the French approach to open science monitoring.

Keywords

Open science, monitoring, evaluation, grey literature

Introduction

One European research policy is to foster open science. The Open Science Monitor¹ has been created as one particular source among many addressed before the European Commission makes proposals for policy in cooperation with Member States of the EU and stakeholders. The objectives are to provide qualitative and quantitative data and insights into understanding the development of open science in Europe, and to gather the most relevant and timely indicators on the development of open science in Europe and other global partner countries.

The Commission launched the Open Science Monitor in 2018. The first results have generally been acclaimed and widely shared on social media. However, at first sight, the underlying methodology of the Monitor focuses on journal publishing and repositories without data on grey literature such as conference papers, theses and dissertations, reports, working papers and so on. Are these simply out of the scope or beneath the radar of the European Open Science Policy? The only “boundary object” of the EC Monitor is the preprint, but only as preliminary versions of published journal articles.

The purpose of this paper is to assess the real and potential place of grey literature in the EC Open Science Monitor, in their data sources, in their methodology and indicators, in published surveys and case studies, etc. Additionally, as the creation of a monitoring system is among the objectives of the new French National Plan for Open Science, the paper provides comparative information about the French approach to open science monitoring. The paper does not assume that “more open science = better science” but assumes that open science monitoring will have a significant impact on the future development of the open science ecosystem as a main paradigm of scientific research in Europe.

Validity

Wiktionary defines “monitoring” as the “*carrying out of surveillance on, or continuous or regular observation of, an environment or people in order to detect signals, movements or changes of state or quality*”². It means to check or to keep track of objects or people, usually for a specific purpose. One quality of any assessment is the reliability and consistency of the measurement. Yet the first requirement of quality is validity, i.e. a shared understanding or social agreement about what should be assessed.

This is the first issue of open science monitoring, as “open science means different things to different people” (Daii et al. 2018). There are various approaches to defining open science, some broader and more inclusive, others more selective, and more or less useful (Bosman & Kramer 2017). Some definitions are presented as taxonomies of open practices or principles (e.g. open data, open access and open peer review), others are rather simple yet not very helpful because they raise new questions about concepts, meanings, limits etc. (“*right to use, reuse, modify, and redistribute scholarly knowledge*” and so on). In its broadest sense, “*open science (...) refers to efforts to make the scientific process more open and inclusive for all*

¹ Open Science Monitor https://ec.europa.eu/info/research-and-innovation/strategy/goals-research-and-innovation-policy/open-science/open-science-monitor_en

² Wiktionary <https://en.wiktionary.org/wiki/monitoring>

relevant actors, within and beyond the scientific community, as enabled by digitalisation” (Daii et al. 2018).

The European Commission defined open science a couple of years ago as *“the transformation, opening up and democratisation of science, research and innovation, with the objective of making science more efficient, transparent and interdisciplinary, of changing the interaction between science and society, and of enabling broader societal impact and innovation”* (Ramjoué 2015). This EC approach is broad and inclusive rather than operational; today, significant emphasis is placed on research data, especially through the European Open Science Cloud (EOSC) and the preparation of the FP9 funding programme (Burgelman & Tsoukala 2018).

Probably the best explanation of the broadness of the EC approach is the understanding of open science as a policy process: *“Open science strengthens the link between science and society, for example increasing the transparency of evidence-based policymaking. It also enables society to handle the ‘data deluge’ more effectively as service providers may step in to curate and evaluate data for interested users”* (Ramjoué 2015). This “social agreement” aspect of social science implies the application of the usual policy instruments such as monitoring.

Policy Monitoring

Monitoring is an integral component of the policy process insofar as it *“describes the development and implementation of policies, identifies potential gaps in the process, outlines areas for improvement, and makes key implementing institutions accountable for their activities”* (Waterman & Brown 1993). Policy monitoring generally follows a two-step process:

- Identification of indicators measuring key activities related to the policy;
- Collection, analysis and dissemination of data on those indicators.

Policy monitoring can also include the identification of key operational policy barriers that should be addressed through policy or program reform. The purpose of policy monitoring is to allow *“policymakers and interested actors to systematically examine the process of creating a policy, implementing it, and evaluating its effects”* (Waterman & Brown 1993). Key indicators of policy impact are, for instance, service utilization, the adaptation of behaviour by the intended population, and even changes to policies. Typical examples of policy monitoring objects are international missions, health systems, and surveillance of climate change and biodiversity and all kinds of discrimination.

Regarding the European open science process, in 2016 the “Amsterdam Call for Action” recommended to *“implement monitoring and stocktaking at regular intervals about the progress made by all parties: the Commission, the Member States and stakeholders”*. The idea was to agree on a *“100% target for 2020”*, and for regular monitoring and evaluation based on standards, systems and services for monitoring and reporting to be established, and to *“regularly refine plans to achieve these targets based on information from monitoring”*, and to mainstream and further promote open science policies (Netherlands’ EU Presidency 2016). Following the Amsterdam paper, national authorities and the European Commission are in charge of policy development and implementation and policy monitoring, while research

funders and research-performing organisations should share expertise and provide data for the purpose of monitoring.

Of particular importance in the era of open science and big data, an OpenAIRE workshop in May 2019 investigated three main issues in research policy monitoring, i.e. the quality and validity of the assessment, the transparency of the process, and the collaboration among the different stakeholders³.

The European “Open Science Monitor”

In line with the Amsterdam Action Plan, the Open Science Monitor was launched in 2018 as a pilot project initially developed by RAND Corporation⁴ for the European Commission, and expanded and updated by a consortium led by the Lisbon Council think tank, with Elsevier as sole sub-contractor⁵. The tool is part of the EC website, managed by the EC Directorate-General for Communication. According to the information on the website, the Open Science Monitor aims to

- *“provide data and insight to understand the development of open science in Europe*
- *gather the most relevant and timely indicators on the development of open science in Europe and other global partner countries.”*

However, the EC site stresses the pilot aspect of the project, which was developed to *“test the viability and value of assessing open science activity in Europe and beyond”* without being an assessment tool: *“The Commission may draw conclusions from the quantitative and qualitative trends in open science and its drivers to propose new policies for fostering open science. However, the Commission will not base its policies fully on it. The Open Science Monitor will be only one particular source among many (...)”*. Criticisms were expressed in particular due to the use of proprietary data for the monitoring (i.e. Elsevier’s Scopus).

Considering open science as an *“approach to research that is collaborative, transparent and accessible”*, the consortium selected *“areas that have consistent and reliable data, specifically: open access, open research data, open scholarly communication and citizen science”* (Smith et al. 2017b). These three fields – open access, open research data and open collaboration – are covered by indicators, while other areas such as open educational resources, open peer review or open methodology are (at least for the moment) marginal or excluded. The consortium admits the limits and beta-character of the website: *“As long as we do not have yet an open data infrastructure(s) available, we are dependent on actors giving access to data sources, which are useful for the tracking and monitoring of open science practices. The current Monitor will therefore not be perfect, but the intention is to be as inclusive as possible in terms of drawing on data-sources and suggestions from experts”*.

“Open access” means open access to scientific publications, a concept meaning journal articles. In fact, the methodological notes and other preparatory documents make use of the terms ‘article’, ‘paper’ and ‘publication’ in a confusingly random way, as if they were all

³ <https://www.openaire.eu/research-policy-monitoring-in-the-era-of-open-science-and-big-data-2>

⁴ <https://www.rand.org/randeurope/research/projects/open-science-monitor.html>

⁵ <https://www.scienceguide.nl/2018/07/elsevier-is-trying-to-co-opt-the-open-science-movement-and-we-shouldnt-let-them/>

synonyms (Smith et al. 2017a; van Leeuwen et al. 2017). Obviously, the consortium does not consider any distinction between publication, paper and article as relevant for their purpose of monitoring open access in Europe. Also, the different sections of the Monitor make almost exclusive use of indicators of journal publishing:

- Trends in open access to publications: this section provides data and case studies covering access to scientific publications, with bibliometric data and data on the policies of journals and funders. It especially contains data on gold and green access to journal articles per country and field of science and technology, retrieved from Scopus and Unpaywall and double checked using different sources, such as the Web of Science (Osimo 2019).
- Funders' policies: the second section provides information about types of mandates established by research funders concerning open access publication and archiving, retrieved from the Sherpa Juliet database with a focus on journals.
- Research journal policies: the last section provides information about types of mandates established by research funders' journals concerning open access archiving policies, produced by the Sherpa Romeo database, also with a focus on journals.

Additional indicators are provided on the number of preprints, on articles published before peer review, and on surveys on the attitudes of researchers towards open access by 101 Innovations, Taylor and Francis, and Nature Publishing Group, along with 30 case studies on the drivers and barriers encountered regarding open science and the direct impact on three main areas, i.e. science, industry and society, including a comparison between the Web of Science and Scopus (Osimo 2019).

All these indicators and studies, except for the preprints, focus on journal publishing without any data on other peripheral or unconventional types of scientific documents such as theses and dissertations, reports, working papers or conference proceedings. Some of the Monitor's sources contain at least some of these documents but the Monitor does not make any distinction, as if they were all just the same kind of resource, with the same value. One probable reason for this is that the key indicators heavily rely on journal platforms, discovery tools and the DOI.

In a personal email to the first author, dated 24 October 2019, Thed van Leeuwen explains why they focus mostly on academic publishing in journals. *"The issue with (grey literature) is that it comes in a variety of appearances. We know of course internationally oriented grey literature, such as reports and policy brief from the EC. On the other hand, we have a wide variety of documents originating from various countries, in various formats and in various languages. Certainly, we see a parallel with academic publishing, as for example also in the social sciences and in particular the humanities, publishing occurs in local language journals, oriented towards a more local audience. However, the part of the academic publishing that is more similar, which means, internationally oriented and mostly written in English, has created more standardization. And although I clearly see the issues connected to standardization, in this case that allows for large scale cross-country analysis of academic publishing, in both closed and OA format. These studies are (...) based upon databases such as Scopus or Web of Science. And unfortunately, such systems do not exist in the realm of a number of other types of analyses we would like to conduct, for example around the study of societal relevance. This seriously limits our possibilities to study the wider circle of activities by academic communities."*

While he can see the interest of grey literature for the study of societal relevance, “*as it would indicate interactions between academics and non-scholarly audiences, for example policy environments*”, Thed van Leeuwen confirms that they “*do not include this type of outputs as we feel we cannot study them in a generic and consistent manner, but mostly due to the lack of sources that allow us to draw conclusions that do right to the type of outputs we study, preferably in an internationally comparative manner.*”

During the preparation of the new version of the Open Science Monitor, the choice of the Scopus database was heavily criticized, especially because of the bias against arts, humanities and social sciences, non-English publications and other journal documents such as books, preprints, reports, conference papers and posters, etc.⁶ As one commentary puts it, “*all these indicators should be named not ‘publications’ but ‘journal articles’ percentages*”.

The Open Science Monitor contains some other indicators relevant for publishing such as open collaboration (citizen science), open peer review, altmetrics and corrections or retractions. None of them appears to make use of other-than-journal data, and none of them even mentions any kind of grey literature.

In brief, the current version of the European Open Science Monitor does not assess the development and implementation of open science policies regarding grey literature, except for preprints which are directly related to journal publishing. Grey literature seems out of the scope of the European open science policy monitoring. It has become invisible.

The French Open Science Monitor

According to Burgelman & Tsoukala (2018), half the European Member States monitor the development and/or growth of open access, in particular with indicators on publications at national level. One example is the Dutch Open Science Monitor on the national open science platform⁷, while other examples are the Danish Open Access Indicator produced by the Danish Agency for Science and Higher Education⁸ and the German Open Access Monitor from the Forschungszentrum Jülich⁹. A fourth example is the French Open Science Monitor¹⁰ developed by the French Ministry of Higher Education, Research and Innovation and presented recently at the ELPUP 2019 conference in Marseille (Jeangirard 2019).

While the Dutch and the German Monitors are limited to journal articles in gold and hybrid journals and open repositories, the Danish monitor includes one type of grey literature, published conference proceedings. Its scope is peer-reviewed, scientific publications - articles and conference contributions - registered in the research databases and institutional repositories of the participating institutions or in other recognized open repositories, and published in proceedings or journals with an ISSN. In the 2017 dataset of 20,645 items, conference contributions represent 5% of the total number of monitored publications, and they

⁶ https://makingspeechstalk.com/ch/Open_Science_Monitor/

⁷ <https://www.openaccess.nl/en/in-the-netherlands/monitor>

⁸ <https://www.oaindikator.dk/en>

⁹ <https://open-access-monitor.de>

¹⁰ Baromètre français de la science ouverte <https://ministeresuprecherche.github.io/bso/>

have been published via proceeding series from SPIE, IOP, Springer (Lecture Notes) etc., which are not really part of grey literature.

The French Open Science Monitor proceeds in a different way, one that is described as transparent, open and bottom-up, and based on the requirements of the French National Plan for Open Science launched in 2018 (Jeangirard & Weisenburger 2019). Instead of using affiliation data from the Web of Science or Scopus, the French Monitor applies a three-step method:

- 1) Identification of publications with a French author
 - a) Constitution of a representative, exhaustive publication database;
 - b) Identification of French researchers (authors);
 - c) Identification and selection of publications (co-)authored by French researchers;
- 2) Enrichment of the selected publications' metadata (institutions, research domains);
- 3) Establishment of accessibility (open access).

Data from different sources undergo quality control and correction procedures. Most of the processing is automated, with manual checks if required. "*The affiliations metadata are key for building an OA monitoring at a national level*" (Jeangirard 2019). Based on a manual check of a random sample, the precision of the identification of French publications was estimated at 96%, i.e. 4% false positive errors (identified wrongly as French). The detection of accessibility with HAL and Unpaywall produces between 3% (for older publications) and 11% (for recent publications) false negative errors (identified wrongly as closed).

The current version of the French Monitor collects data from different, openly (publicly) available sources, in particular Unpaywall (>100m items with 24m OA items) and the French national HAL repository (>1.5m items). Other sources are used to identify French researchers (like the French SUDOC academic union catalogue with its IDRef author identifier, the French PhD portal thèses.fr, and the ORCID database) and to enrich the metadata (like the French PASCAL and FRANCIS databases and the RNSR national directory of scientific structures). The main challenges are the data volume and variety (DOI, affiliations...) and the dynamics of open accessibility, i.e. the evolution of the publications' status (from closed to open). The results will be made publicly available on the French open data platform (data.gouv.fr).

The inclusion of grey literature is conditioned by the DOI. Insofar as the assessment of accessibility via Unpaywall requires a DOI, all documents with DOI are considered and nothing else. The attribution of DOIs is not limited to commercial journal publishing; the metadata of the Crossref database show evidence of conference papers, reports and other "posted content". Yet the Crossref 2017/2018 annual report¹¹ shows that this part is rather small; out of the more than 101m Crossref records, 0.08% are preprints, 0.2% are dissertations, 0.6% are reports and 5.5% are conference papers, most of the latter being published in commercial conference proceedings series and not as grey literature (see above).

Therefore, "*as a consequence of our first choice to reduce the perimeter to publications with a DOI (...) the majority of publications that we analyze are journal-articles (86.7%)*". The French dataset contains 7,004 "*proceedings-articles*" (sic), representing 5.3% of the total number of 132,970 identified publications by French (co-)authors in 2017 – "*probably an underestimation*

¹¹ <https://www.crossref.org/annual-report/>

of the reality” (Jeangirard 2019). The other categories are either marginal (“others”) or not grey (books and chapters).

The French Monitor does not currently collect (meta)data from publications from other sources, but this remains an option. According to the project team, the future version may include French dissertations from 1990 on (source: theses.fr portal), books (source: SUDOC) and perhaps some HAL collections, such as the LARA collection with more than 30,000 scientific and technical reports¹². Including the theses.fr and LARA data would potentially add about 13,000 PhD dissertations and 1,500 reports per year to the Monitor data, increasing the grey part of open science monitoring from its current 5% to 15%.

Discussion and Conclusion

Open science monitoring is part of policy monitoring, and seeks to describe the development and implementation of open access and open science. The analysis of the European Open Science Monitor and similar tools in the Netherlands, in Denmark and especially in France shows that they all produce indicators on open access to scientific publications mainly or exclusively in the field of journal publishing, neglecting and marginalizing other types of scientific publishing, grey literature above all. The only grey resources considered so far are preprints and conference papers but both are, as shown above, directly related to journal publishing.

Yet as the French initiative seems to confirm, there is real potential for including grey literature, especially for theses and dissertations and scientific and technical reports, but probably also for other categories such as conference papers, posters and presentations, and working papers. How can we explain the current situation?

Common Issues of Grey Literature

The first reason for the lack of grey literature in the tools of open science monitoring is probably that grey literature is... grey, with a large diversity of formats and languages, poor standardization and recording, and few generally accepted and harmonized identifiers. In particular, many grey resources still lack a DOI, which is a barrier not only for the application of altmetrics (Schöpfel & Prost 2017) but also today for monitoring based on data resources like Crossref and Unpaywall.

Also, particularly in institutional and other open repositories, grey resources are not always easy to identify because of lacking, misleading or ambiguous metadata describing document types. Thed van Leeuwen points out that large international reservoirs of grey literature are missing.

A third “common issue” of grey literature is the supposed lack of quality control. All monitoring tools lay emphasis on “certified content”, i.e. on peer-reviewed journal articles, which is another, well-known and often addressed handicap of grey literature in this environment.

¹² <https://hal-lara.archives-ouvertes.fr/>

Tools in Transition

Political pressure and the speed of change may be another reason. In fact, technical and organisational feasibility is another quality criterion of measurement – the best indicator is without interest or value if it cannot be achieved with reasonable resources and delays. Prioritizing the most important and the (relatively) easy-to-produce indicators is a realistic approach when a project team or consortium has to meet tight deadlines.

The methodology of the Open Science Monitor is not definitive, and will be updated on a regular basis in the course of the project until the end of 2019. The EC has announced that new indicators and data will be uploaded over the next few months. They also described the Monitor as a “collaborative effort” and invited the community to contribute.

The national Monitors have adopted similar strategies, describing the current version as experimental, a test, a draft or transitional tool that will continue to develop. Thus the feedback loop of policy monitoring impacts and shapes not only policy development and implementation, but also the monitoring devices themselves, depending on policy changes, outcome evaluation of the existing tools, new technologies, new data sources and new requirements from the community.

The French Monitor clearly expects to exploit more data sources, including grey literature reservoirs, increase the variety and diversity of data on open access and the representativity and exhaustivity of the publication database. Following the comments from the European consortium, a similar agenda for the European Open Science Monitor is unlikely, for the reasons mentioned above. As for the community criticism and recommendations during the initial project phase, the updated methodological note published 4 April 2019 provides some answers to these comments but limits further exploitation of open access data to the Web of Science and Unpaywall, arguing *inter alia* that only few received proposals were “*immediately actionable*”, and that “*most proposals need additional effort, and that some are not deemed relevant*”¹³. OpenAIRE¹⁴ could be such a new data resource, as it contains more than 7.5m grey items, preprints, conference objects, reports, theses and dissertations out of over 30m total publications. For the moment, however, the Open Science Monitor methodological note does not mention this option.

Due to the diversity of languages and data reservoirs (databases, catalogues, repositories...), it may be easier to include grey literature in national than European monitoring.

The “Seepage” of Grey Literature

As mentioned above, the quality of monitoring depends on the reliability (consistency) and the validity of the assessment. Considering open access, the validity criterion requires a kind of shared understanding – a social agreement of what accessibility of scientific publications means. Such a shared understanding on open access does not exist, either on gold or green roads, on business models (APCs or platinum), or on licensing (libre or gratis?) or reuse conditions... While many publishers, funding bodies, research-performing organizations and authorities focus on journal publishing as the mainstream dissemination of research results,

¹³ https://ec.europa.eu/info/sites/info/files/research_and_innovation/open_science_monitor_methodological_note_april_2019.pdf

¹⁴ <https://www.openaire.eu/>

other initiatives and communities argue for a larger variety of knowledge production and business models (“bibliodiversity”)¹⁵.

However, in the public debate, as in scientific literature about academic publishing, the impression prevails that non-conventional publications (= not published as journal articles) do not exist or at best are not relevant for evaluation and monitoring. For instance, a recent monograph on scholarly communication published by one of the most important academic publishers simply omits speaking of other kinds of scientific literature except journals (De Silva & Vance 2017). Does grey literature become invisible or, to use a geological term, are we witnessing a kind of “seepage” of grey literature in the mainstream of academic publishing? What is invisible often does not exist, at least in political strategies. Grey items are still somewhere outside but who really cares?

There is a famous quote, often (mis)attributed to Albert Einstein: “Not everything that counts can be counted, and not everything that can be counted counts”. Nevertheless, without any reliable data monitoring of grey literature, how will the European Commission (and the French Government) conduct an inclusive and comprehensive open science strategy and foster the production, discovery and curation of the grey part of scientific production in the new research ecosystem?

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References

BOSMAN, Jeroen and Bianca KRAMER, 2017. *Defining Open Science Definitions* [online]. I&M / I&O 2.0. [Accessed 15 September 2019]. Available from: <https://im2punt0.wordpress.com/2017/03/27/defining-open-science-definitions/>

BURGELMAN, Jean-Claude and Victoria TSOUKALA, 2018. Open Science in Europe: The Perspective from the European Commission. *OPERAS Conference: Open Scholarly Communication in Europe. Addressing the Coordination Challenge* [online], Athens, 31 May 2018. [Accessed 15 September 2019]. Available from: <http://helios-eie.ekt.gr/EIE/bitstream/10442/15720/2/BURGELMAN.pdf>

DAll, Qian, Eunjung SHIN, and Carthage SMITH, 2018. Open and Inclusive Collaboration in Science: A Framework. *OECD Science, Technology and Industry Working Papers* [online], No. 2018/07. [Accessed 15 September 2019]. ISSN 1815-1965. Available from: <https://doi.org/10.1787/2dbff737-en>

¹⁵ See the French *Jussieu Call for Open Science and Bibliodiversity* <https://jussieucall.org/jussieu-call/>

DE SILVA, Pali U.K. and Candace K. VANCE, 2017. *Scholarly Communication: The Changing Landscape*. Springer: Berlin. ISBN 978-3-319-50626-5.

JEANGIRARD, Eric, 2019. Monitoring Open Access at a National Level: French Case Study. *ELPUB 2019 International Conference on Electronic Publishing* [online], June 2019, Marseille, France. [Accessed 15 September 2019]. Available from: <https://doi.org/10.4000/proceedings.elpub.2019.20>

JEANGIRARD, Eric and Emmanuel WEISENBURGER, 2019. Utilisations de bases et référentiels ouverts pour aider au pilotage de politiques publiques: Exemples de ScanR et du Baromètre de la Science Ouverte. *Journées de l'ABES* [online], Montpellier, 29 May 2019 [Accessed 15 September 2019]. Available from: <https://www.slideshare.net/abesweb/jabes-2019-session-plnire-baromtre-de-la-science-ouverte-et-scanr-moteur-de-la-recherche-et-de-linnovation-deux-outils-au-service-de-lactivit-scientifique>

NETHERLANDS' EU PRESIDENCY, 2016. Amsterdam Call for Action on Open Science. *Open Science, from Vision to Action* [online report]. Amsterdam, 4-5 April 2016 [Accessed 15 September 2019]. Available from: <https://www.government.nl/topics/science/documents/reports/2016/04/04/amsterdam-call-for-action-on-open-science>

OSIMO, David, 2019. Building Together an Open Science Monitor: Tracking Trends for Open Access, Collaborative and Transparent Research Across Countries and Disciplines. *Open Science Conference* [online], Berlin, 19-20 March 2019. [Accessed 15 September 2019]. Available from: https://www.open-science-conference.eu/wp-content/uploads/2019/03/01_osc2019_presentation.pdf

RAMJOUE, Celina, 2015. Towards Open Science: The Vision of the European Commission. *Information Services & Use* [online], **35**(3), 167–170. [Accessed 15 September 2019]. <https://doi.org/doi:10.3233/isu-150777>

SCHÖPFEL, Joachim and Hélène PROST, 2017. Altmetrics and Grey Literature: Perspectives and Challenges. *The Grey Journal* [online], **13**(1), 5-22. [Accessed 15 September 2019]. Available from: <https://hal.archives-ouvertes.fr/GERIICO/hal-01405443>

SMITH, Elta, et al., 2017a. *Monitoring Open Science Trends in Europe* [online]. RAND Corporation: Santa Monica, CA. [Accessed 15 September 2019]. Available from: <https://doi.org/doi:10.7249/TL252>

SMITH, Elta, et al., 2017b. *Open Science Monitoring: Methodological Note* [online]. RAND Corporation: Santa Monica, CA. [Accessed 15 September 2019]. Available from: https://www.rand.org/pubs/external_publications/EP67274.html

VAN LEEUWEN, Thed, Ingeborg MEIJER, Alfredo YEGROS-YEGROS, and Rodrigo COSTAS, 2017. Developing Indicators on Open Access by Combining Evidence from Diverse Data Sources. *Proceedings of the 2017 STI Conference* [online], 6-8 September, Paris, France. [Accessed 15 September 2019]. Available from: <https://arxiv.org/ftp/arxiv/papers/1802/1802.02827.pdf>

WATERMAN, Richard W. and B. Dan WOOD, 1993. Policy Monitoring and Policy Analysis. *Journal of Policy Analysis and Management* [online], **12**(4), 685–699. [Accessed 15 September 2019]. Available from: <https://www.jstor.org/stable/3325346>