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Applications of Grey Literature for Science and Society

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Foreword

APPLICATIONS OF GREY LITERATURE FOR SCIENCE AND SOCIETY

The title of GL2020 Conference, "Applications of Grey Literature for Science and Society," draws the attention of scientists, experts, citizens, and policymakers to the principal capacity of grey literature: its implementation for the benefit not only of a single community of practice but for the society as a community of people.

Grey Literature embraces all sectors of government, academics, business, and industry. Its long-standing tradition has collected a mosaic of different documentary types: from scientific papers to a broad range of technical or administrative materials produced by public or private institutions, associations, industries, and foundations at the local, national, or international level.

In the age of Open Science, Grey Literature becomes crucial in expanding the boundaries of knowledge and make it accessible to the general public. Indeed, it is inclusive of a wide choice of documentary materials that are not always easily accessible. Thus, it contributes to discovering and developing a variety of primary interest topics for the citizenry (e.g., environmental protection, health, and justice) and highlights urgent social needs and priorities.

In this view, this edition of the GL conference represented a significant opportunity to gather experts in the developments of Grey Literature and stakeholders of different areas of interest. It emerges in the titles of the three main conference sessions: "Areas of study with applications to Grey Literature", "The influence of Grey Literature on Open Access", and "New developments in the field of Grey Literature", which followed the Panel Session organized by FAO representatives and dedicated to the employment of GL in crucial areas such as agriculture and fishery.

This perspective has been somehow favored by the actual circumstances, which forced us to organize this year's appointment remotely. Due to the Covid-19 pandemic, we had to move the meeting online and learn how to make it successful despite the organizational challenges we had to face. Nevertheless, we tried to take vantage of a complicated situation and turn it into an opportunity to enlarge the GL community and reach people from all over the world. Based on the number of registrants and those who joined online, we may reasonably believe that we played a successful strategy. Participants logged on from Japan and California, from Africa as well as from Northern Europe and China.

The twenty-second edition of the GL conference should represent an innovation: after twenty-one successful years with GreyNet, its organization passed to the Italian National Research Council (CNR), seeing the cooperation between CNR Central Library "G. Marconi" and CNR-ISTI. We accepted gladly and concentrated our efforts to allow the organization to work in full swing. Thus, we thank Dominic Farace and GreyNet for the opportunity: it has been a pleasure for us to give a substantial contribution to the growth of the GL community. We also express our gratitude to the conference authors for their involvement and cooperation in making this edition a success. Last but not least, we thank all participants who joined the conference for their interest in GL2020.

Silvia Giannini & Anna Molino — *Pisa, Italy*
INSTITUTE OF INFORMATION SCIENCE AND TECHNOLOGIES, ISTI CNR — FEBRUARY 2021

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Open Science and the Transformation of Scholarly Communication[1]

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Abstract

The continuing transition toward open science is fundamentally changing both the ways in which scientists communicate research findings and what they communicate. Open science places emphasis on enhanced access not only to published research findings but also to elements of grey literature: pre-published literature (preprints), underlying research data, study protocols, and other products of the research process. This presentation reviews the transformation in scholarly communication associated with open science and illustrate the ways in which libraries and other information service providers can support it, drawing on examples from the U.S. National Library of Medicine. Particular attention will be devoted to efforts to support open science as part of the ongoing response to the COVID-19 pandemic.

Introduction

A significant change is taking place in the way the scientific community works and interacts. This change can be characterized as more widespread adoption of the principles and practices of open science. Open science is not new to science, nor to the grey literature community, but it is gaining more widespread adoption. In the last year alone, considerable progress has been made around the world in advancing open science, both as a continuation of a longstanding trajectory and as a response to the unprecedented, pandemic-inspired times in which we are living. The acceleration of the open science transformation presents new opportunities for the Grey Literature community.

Illustrations of the ways open science is transforming scientific communications can be seen in the work of the U.S. National Library of Medicine (NLM).[2] NLM is a component of the U.S. National Institutes of Health (NIH). Like other parts of NIH, NLM funds and conducts research, with its focus on biomedical informatics and data science. NLM is also a library, the world's largest biomedical library by any of several measures. It is well-known for the range of information services it develops and provides. These include:

- Literature resources, such as Pubmed,[3] the database of more than 30 million citations and abstracts to the biomedical literature, and PubMed Central (PMC),[4] a digital archive of full text biomedical literature
- Scientific data resources, such as ClinicalTrials.gov,[5] a registry and results database for clinical trials, and the Database of Genotypes and Phenotypes,[6] which holds and shares data from studies of the relationship between variations in genotypes and the expression of disease or other features.
- Consumer oriented information, such as MedlinePlus,[7] which provides consumer-friendly information from trusted sources on more than 1000 diseases and conditions.

[2] See https://www.nlm.nih.gov/

[3] https://pubmed.ncbi.nlm.nih.gov/

[4] https://www.ncbi.nlm.nih.gov/pmc/

[5] https://clinicaltrials.gov/

[6] https://www.ncbi.nlm.nih.gov/gap/

[7] https://medlineplus.gov/

With the more than 8,000 organizational members of the Network of the National Library of Medicine,[8] NLM works to ensure widespread awareness and effective use of these resources. Together, these resources position NLM as a platform for biomedical discovery and data-powered health – and a home of open science

Open Science and Scholarly Communications

Open science is a set of principles and practices that make the products and processes of scientific research more findable, accessible, interoperable, and (re)usable (FAIR).[9] It is about making these resources FAIR for all those who can use them--scientists, innovators and entrepreneurs, students, and educators, and members of the general public--recognizing, of course, that some information resources cannot be widely shared out of respect for privacy, confidentiality, national security, and other concerns.

By making the products of research more widely available, open science can accelerate science, improve its rigor and reproducibility, spur innovation, improve health, enhance education, strengthen the economy, advance other societal objectives, and build trust in science. All of these outcomes increase the return on investments in research. Many individuals and institutions have roles to play in advancing open science, including scientists, research administrators, funding agencies, libraries and archives, publishers, and information technology professionals.

Traditionally, and certainly in the sciences, scholarly communication focuses largely, if not exclusively, on literature, in particular peer-reviewed scholarly publications that report on the results of research. Open science certainly includes scholarly publications, but also drives interest in making more of the scientific process and its outputs accessible and available for use. These outputs include:

- Related study data, e.g., the data sets generated in a research study. In medical research, this includes associated clinical data that may have been a source of information for research;
- Study protocols that describe in detail the aims of the research (e.g., hypotheses to be tested), how the research was conducted, and how the data were collected and analyzed;
- Code and software that was used to analyzed data and help generate the results, which can be necessary for validating results and reusing data;
- Funding information that describes the sources of funding for a research study, which is of particular interest to understanding potential conflicts-of-interest and enables funders to track the outcomes associated with their investments;
- Information about instrumentation and other critical infrastructure used in the research, which can demonstrate the utility of those resources and support reproducibility;
- People involved in the research, including the authors of any research publication as well as those who contributed in other ways, such as managing the data and developing the code used to analyze it; and
- Analytical pathways and pipelines used to manipulate the data.

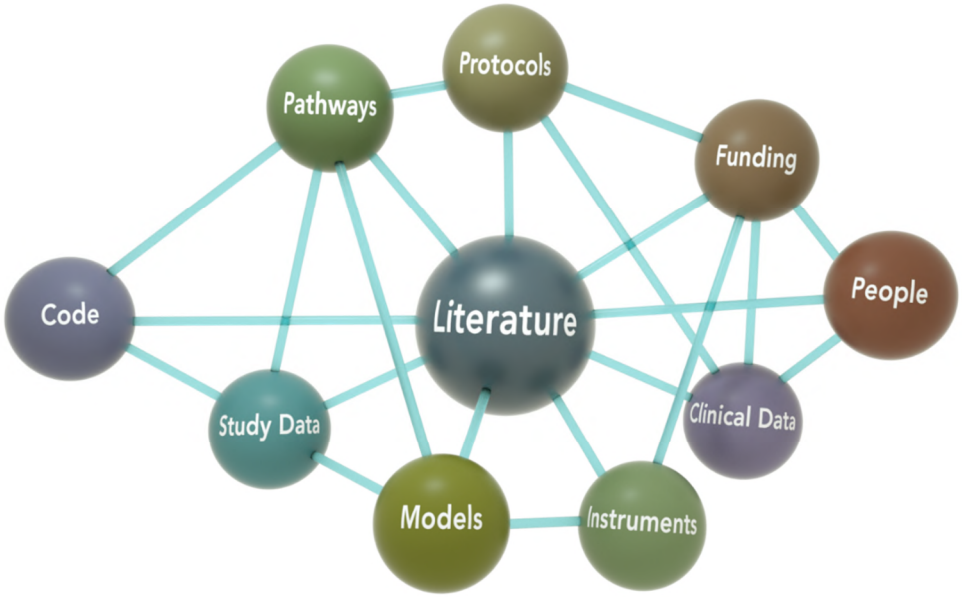
The value of increasing access to these research objects can best be achieved by connecting them together, creating the linkages that allow a user to navigate from one element to the other, ideally with the click of a button (Figure 1). With robust linkages

[8] https://nnlm.gov/

[9] See https://www.nature.com/articles/sdata201618

between an among elements, users can enter a research network via any of the research objects and navigate their way to related information. Creating an interlinked network of associated research objects requires considerable effort from stakeholders across the broader research and scholarly communication enterprise to promote things like interoperability, to assign unique identifiers to research objects, and help ensure the quality and trustworthiness of those research objects.

Figure 1. Network of Interlinked Research Objects



Pubmed Central as Hub For Open Science

Recent work of the NLM illustrates the interlinking that can advance open science and expand the accessibility of research objects beyond (but including) scholarly publications. One example centers around NLM's PubMed Central (PMC), the digital archive of full-text biomedical literature. PMC contains a growing collection of more than 6.5 million articles submitted by journals and by authors who deposit their manuscripts in compliance with the NIH Public Access Policy.[10] That policy requires researchers whose work is funded by NIH to ensure that their final, peer reviewed manuscripts or final published articles are submitted at the time of publication to PMC, where they are made freely and publicly accessible not more than 12 months later.

PMC is heavily used by researchers, care providers, students, educators, and the general public. Each day, some 3 million unique visitors retrieve some 6 million articles. A growing subset, now equal to more than half of the total content, is available not only for individual retrieval but also for bulk downloading to support text mining and machine learning applications. That subset includes articles published using open access mechanisms and those submitted as author manuscripts

Recognizing its high usage by a wide range of users, NLM has begun to use PMC as hub to support access to other research resources associated with available articles. Most notably, PMC is being used to improve the discoverability of associated data. This can take the form of: 1) a data citation that provides a link to a data set in an external data repository; 2) a link to a data availability statement in the article that provides a

[10] https://publicaccess.nih.gov/

narrative description of data and how to access it; or 3) a link to data submitted to PMC as supplemental material.

PMC accepts small datasets, up to 2GB in size, that are associated with submitted articles. NLM issued updated guidance describing procedures for doing so.[11] If there is no existing persistent identifier for the dataset, NLM will generate and display with the article a globally unique identifier to support the citation and discovery of this content.

As of October 2020, more than 1.5M articles in PMC had an associated dataset. PMC has search filters to allow users to find articles that include associated data. Adding this feature has resulted in a notable increase the number of data sets accessed through PMC. NLM expects an increase in the availability of datasets related to biomedical journal articles as a result of the new NIH Data Management and Sharing Policy.[12] This policy, issued in October 2020, requires that all applicants for NIH funding provide with their application a data management and sharing plan that outlines the data to be collected in the study and proposed approaches for preserving and sharing the data.

NIH has developed a recommended approach for researchers to use in selecting a data repository for preservation and sharing.[13] It expresses a preference for deposit in a disciplinary or data type-specific repository, including the 80 or so repositories supported by NIH.[14] It also calls out the role of PMC, cloud storage, institutional repositories, and generalist repositories as acceptable repositories for data preservation and sharing. NIH also identified a set of desired characteristics for those repositories – characteristics such as assigning a persistent ID, attaching good metadata, having plans for long-term sustainability.

To further advance open science, NLM has also begun including certain preprint articles in PMC through a new Pilot Project.[15] This step is significant for NLM because it includes content that has not been peer reviewed in a flagship literature systems. To help address concerns about the quality of preprint literature, the pilot was launched in June 2020 with a focus on preprints resulting from NIH-funded research that are deposited in preprint servers that demonstrate a set of good practices, e.g., they offer basic screening for quality, assign identifiers, have processes for updating and linking to final articles. The first phase of the pilot focuses exclusively on COVID-19 related research, where the immediacy of access to results is paramount. In addition, PMC contains various banners, labels, links, and filters to help ensure users recognize these entries as preprints, understand that they have not been peer reviewed, and to control whether they are included or excluded from search results.

As of October 2020, PMC contained more than 1,000 preprints dating back to January 2020. About 30 percent had been published – and PMC links to the published version. The remaining 70 percent are available ahead of publication, satisfying NLM's aim of accelerating access to these important research results. NLM is evaluating the first 3 months of the Pilot to help inform future steps and possible expansions.

NLM is also working with publishers to make open peer review materials available in PMC. Not many journals have yet taken the step of adopting open peer reviews, but NLM is working with those that are doing so and helping to identify preferred

[11] See https://www.ncbi.nlm.nih.gov/pmc/about/guidelines/#suppm
[12] https://grants.nih.gov/grants/guide/notice-files/NOT-OD-21-013.html
[13] https://grants.nih.gov/grants/guide/notice-files/NOT-OD-21-016.html
[14] https://www.nlm.nih.gov/NIHbmic/domain_specific_repositories.html
[15] https://www.ncbi.nlm.nih.gov/pmc/about/nihpreprints/

approaches. NLM issued guidance a year ago about tagging peer review documents to submit with articles in PMC.[16] The preferred approach is to have peer reviews submitted as separate objects that can be independently identified and linked to the journal article, rather than having them bundled together with the article as a single object.

Clinicaltrials.Gov as an Open Science Platform

NLM's ClinicalTrials.gov provides another example of how grey literature can become better integrated into open science. ClinicalTrials.gov contains information about clinical trials conducted in the United States and elsewhere in the world, by public and private sector organizations. Some trials are required to register and submit summary results – namely those studying drugs, devices and biological products that require marketing approval from the US Food and Drug administration and those of any type of intervention that are funded by NIH.[17] Registration provides structured information summarizing key elements of the study protocol: study design, eligibility criteria, and locations of trial sites. Summary results includes tables of information summarizing participant characteristics, outcome measures by arm of the trial, and adverse events.

As of October 2020, ClinicalTrials.gov contained registration information for more than 350,000 studies, and results information for more than 45,000 them. For clinical trials subject to regulations and NIH policy, results must be submitted regardless of whether they are formally published. Recent research has found that about one-third of registered trials did not result in a peer reviewed journal article as long as 5 years after the completion date.[18] [19]

Like PMC, ClinicalTrials.gov is becoming a hub for open science—clinical science, in particular. In addition to summary results, Responsible Parties are also required to submit their full protocol documents and statistical analysis plans (if separate). Under separate human subjects protection regulations in the United States, responsible parties must also submit the informed consent forms used to communicate information to potential participants about the benefits and risks of participating in the study.

NLM systematically connects records in ClinicalTrials.gov to associated journal publications – including those in PMC. NLM is also exploring the other elements of grey literature to include or link to: information such as conference abstracts, clinical study reports, and press releases. NLM is also considering ways to link to external data repositories that contain the participant level data underlying the summary data we receive – recognizing that additional protections are needed for that data.

Open Science and the Response to Covid-19

Platforms such as PMC and ClinicalTrials.gov have enabled NLM to contribute in important ways to the global response to the COVID-19 pandemic. In March 2020, the director of the White House Office of Science and Technology Policy and science ministers and advisors of a dozen other called upon publishers to make freely and immediately available all publications reporting on COVID-10 and the broader family of coronaviruses.[20] To ensure easy discoverability of and access to these publications, they

[16] https://researchintegrityjournal.biomedcentral.com/articles/10.1186/s41073-019-0063-9
[17] https://clinicaltrials.gov/ct2/manage-recs/background
[18] https://pubmed.ncbi.nlm.nih.gov/22214755/
[19] https://www.bmj.com/content/352/bmj.i637
[20] https://www.imagwiki.nibib.nih.gov/content/ostp-president-trumps-science-advisor-and-government-science-leaders-around-world-call

requested that publications be made available through systems like PMC in formats that would allow automated text processing.

The response to that call to action was unprecedented. More than 50 major commercial and society publishers began working with NLM to modify workflows begin submitting articles in machine readable forms with no embargo. As of October 2020, NLM had more than 140,000 articles in its COVID-19 literature collection, dating from 1970 to present. Of these, 77,000 specifically related to COVID-19; the others to the broader family of coronaviruses. Through the end of September 2020, these articles had been retrieved a combined total of more than 80 million times—far above the average for recent literature.

NLM has made these articles available to a larger public-private partnership that has assembled an even larger collection of coronavirus articles to support text mining. The COVID-19 Open Research Dataset, or CORD-19, maintained by the Allen Institute for Artificial Intelligence, has become a resource for the artificial intelligence and machine learning community to develop and apply natural language processing algorithms.[21] It has been used in several challenges and competitions aimed at text mining the collection to gain new insight into COVID-19.[22] [23]

ClinicalTrials.gov also plays an important role in the response to COVID-19, providing information to researchers, clinicians, and the public about relevant clinical trials related. To ensure rapid dissemination of comprehensive information about COVID-19 research, NLM adapted and streamlined submission procedures and has prioritized the processing of coronavirus-related information. NLM is also providing one-on-one support to researchers during the process of submitting results information to ClinicalTrials.gov to address questions and optimize reporting. New features ensure that information about COVID-19 studies registered on the World Health Organization's International Clinical Trial Registry Platform are discoverable through ClinicalTrials.gov. As of October 2020, registration information was available for almost 4,000 clinical trials registered directly with ClinicalTrials.gov and an additional 3,000 trials registered with the WHO.

Recognizing the value of making information about COVID-related clinical trials available as rapidly as possible to the widest possible audience, NIH Director, Francis Collins issued a statement strongly encouraging the clinical research community to register their clinical trials and submit summary results information for COVID-19 and SARS-CoV-2 trials as quickly as possible and ahead of regulatory and policy deadlines.[24] This statement comes as a number of important, large scale vaccine and therapeutic trials are drawing closer to completion.

Next Steps for Grey Literature

As these examples illustrate, there is a growing opportunity associated with open science to improve the discoverability of, access to, and utilization of a diverse set of research outputs, including many outputs that would be considered grey literature. The fact that grey literature tends to be more open – less encumbered by restrictions on use – has to potential to make it easier to integrate into open science networks.

[21] https://allenai.org/data/cord-19
[22] https://www.kaggle.com/allen-institute-for-ai/CORD-19-research-challenge
[23] https://ir.nist.gov/covidSubmit/
[24] https://www.nih.gov/about-nih/who-we-are/nih-director/statements/nih-calls-clinical-researchers-swiftly-share-covid-19-results

The opportunities are accentuated by the growing interest in open science resulting from ongoing experience in the response to the COVID-19 pandemic. There is greater appreciate of the value of making research outputs more readily available and accessible and of making them more interoperable and usable. The urgency around the situation has also engendered a greater willingness among all parties to experiment with new approaches to opening science and breaking with traditional models.

This all bodes well for grey literature. There is an opportunity to seize. Clearly there are challenges to address in making grey literature in its many forms more findable, accessible, interoperable and reusable. Should the community establish platforms and networks that make grey literature more FAIR, integrate grey literature into other emerging open science networks, or make grey literature more discoverable through major search engines. A combination of these approaches may help best ensure that grey literature is integrated into open science.

Plotting next steps will take collaboration among the many individuals, organizations, and stakeholders involved in grey literature and open science networks. The grey literature community must explore ways to engage with the broader stakeholder community to advance those discussions and engage more deeply in open science, further advancing the transformation that is well under way.

Increasing the availability of West African Grey Literature to improve marine fisheries management

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Daryl Superio, Aquaculture Department, Southeast Asian Fisheries Development Center, Philippines.
Arame Keita, Direction des Pêches Maritimes, Dakar, Senegal

Abstract
The Fishery Committee for the Eastern Central Atlantic (CECAF) seeks to promote the sustainable utilization of the living marine resources across the Eastern Central Atlantic between Cape Spartel and the Congo river through informed development of fisheries management actions. Aquatic Sciences and Fisheries Abstracts (ASFA) is contributing to the CECAF-PESCAO project "Improved Regional Fisheries Governance in Western Africa", by developing a comprehensive inventory of marine fisheries research covering both primary literature (available online on both commercial and free to use platforms) and grey literature available at institutions holdings and not always accessible online. This assessment of fisheries management research in the region will enable CECAF, ASFA and, critically, member countries the means to access relevant contextual and discernible science-based materials and publications. Cataloguing and subsequent bibliometric analysis of large amounts of information specific to regional fisheries management will encourage solid research-based fisheries management recommendations at the national level by highlighting areas of fisheries management to investigate. This paper presents the preliminary results of the research inventory and bibliometric analysis, comparing the amount and type of information available in primary and grey literature collections for the region and at individual country level.

Introduction

In recent years, Aquatic Sciences and Fisheries Abstracts (ASFA) has made a concerted effort to improve the coverage of Grey Literature on its database. Steps taken to achieve this have included a Conference held in Malaysia in 2019 on 'Enabling Grey Literature discovery to benefit aquatic science, fisheries and aquaculture' and a special issue of the ASFA Magazine focused on aquatic science grey literature (FAO, 2019). These steps highlighted the need to take a regional approach to managing grey literature, with one paper citing the volume of marine grey literature being produced in Africa and the need to ensure that this resource was made available through online repositories, due to it often not being made available in primary research publications (Messaoudi, 2019). The difficulties of defining and quantifying grey literature make it difficult to assess both its volume and accessibility in a given region or country. The chance to participate in a regional project, such as CECAF-PESCAO, meant ASFA could test the belief that considerable volumes of marine grey literature were being produced in Africa and assess their accessibility, making recommendations to improve the management of GL to enhance its use among researchers worldwide.

CECAF-PESCAO is an EU funded project, which began in December 2018, its aim: "Improved Regional Fisheries Governance in Western Africa."[1] As an international partnership of over 100 aquatic science, fisheries and aquaculture institutions, ASFA has a near fifty-year history of promoting Grey Literature and has a strong network of partners in Africa (Vicary, 2020). With nine ASFA partners in the CECAF region in particular (namely: Institut de Recherches Halieutiques et Océanologiques du Bénin; Centre de Recherches Océanologiques, Cote d'Ivoire; Ghana Fisheries Commission; Centre National des Sciences Halieutiques de Boussoura, Guinea; Institut Mauritanien de

[1] For further information on CECAF-PESCAO project, see: http://www.fao.org/cecaf/projects/pescao-project/zh/

Recherche Océanographique et des Pêches, Mauritania; Institut National de Recherche Halieutique, Morocco; Nigerian Institute for Oceanography and Marine Research; La Direction des Pêches Maritimes, Senegal, and Instituto Español de Oceanografía, Spain), ASFA was ideally placed to support the CECAF-PESCAO project. ASFA's experience and network meant it was able to support output 1.2 of the project in particular: "Collaboration on data and information sharing procedures and research enhanced between relevant countries, sub-regional and regional organizations to harmonize data and knowledge." To achieve this output, it was agreed between ASFA and CECAF-PESCAO that an inventory of marine fisheries research in the region be compiled, which would highlight the research capacity, strengths and away weaknesses of individual countries and the region as a whole. It is hoped the inventory can be used to identify marine fisheries research areas to focus on in the future, as well as build a strong, collaborative network in the region to enable the management and promotion of this research.

The work to compile the inventory also presented an opportunity to assess the amount of Grey Literature being produced in the region, and whether this was easily accessible via online sources or further work was needed to promote this resource. To assist this investigation, compilation of the research inventory was split into two stages:

1. **Online sources:** a search methodology was agreed and used to identify relevant research held on a number of online sources (ASFA, Scopus, Web of Science, Google Scholar).
2. **Nationally held collections:** nine consultants were recruited from the following countries: Benin, Cote D'Ivoire, Ghana, Guinea, Mauritania, Morocco, Nigeria, Senegal and Spain. Each consultant received training in the search methodology agreed in stage one to enable them to identify research relevant to the project in nationally held collections (libraries, institutional repositories and websites). This would then be checked against the results in stage one for deduplication.

This paper presents the methodology and preliminary results of the activities conducted at both stages, as well as a summary and recommendations for future work. At time of writing, in-depth bibliometric analysis of the inventory is being undertaken with the results due to be published by the CECAF-PESCAO project in February 2021. Effective management of marine fisheries resources depends on FAIR (findable, accessible, interoperable and reusable) research; work to date on this project has shown researchers from the CECAF region face barriers in achieving this and we therefore recommend work is undertaken provide researchers with access to technologies as well support from information managers and libraries, to enable their work to be deposited in Open Access repositories. We also recommend that publishing barriers are investigated as a possible cause for over-reliance on predatory journals by authors in the region.

Methodology

This section presents the methodology used to build the inventory in stages one and two. The same search criteria was used in both stages in order to identify research relevant to the CECAF-PESCAO project. A set of keywords was agreed between ASFA and the CECAF-PESCAO project team to ensure searches were specific to marine fisheries – for example excluding aquaculture and inland/ freshwater topics. Though the exact keywords used varied slightly, depending on the source being searched and whether a controlled vocabulary was used, the keywords were:

- Fishery biology
- Fishery management
- Marine and fisheries policy
- Ecosystem modelling
- Gender and socioeconomic aspects of fisheries
- Climate change (its impact on marine fisheries)
- Marine Protected Areas (MPAs)

To enable an assessment of current research capacity, strengths and weaknesses, results were limited to the last 10 years and restricted to research conducted by authors affiliated to an institution in the region – this ensured the inventory measures research capacity in the region as opposed to volume of research conducted in the area.

Stage 1. Recording of online resources on research inventory

Stage one took place from September - December 2020 and was conducted by Daryl Superio with support from the ASFA Secretariat and CECAF-PESCAO project team. In total, four major online sources (ASFA, Web of Science, Scopus, and Google Scholar) were searched for marine fisheries research output. Relevant results were exported from these sources onto an Excel spreadsheet. In order to gather additional metadata required for the bibliometric analysis (Author Affiliation and Gender) a series of additional searches was then performed to identify the gender of the author and affiliation (where missing). Results from the four sources were then consolidated into one spreadsheet, deduplicated and standardised.

Stage 2. Nationally held collections

Originally planned to take place as a workshop in Senegal, all activities were moved online due to the Coronavirus pandemic. A series of four online training sessions were held November – December 2020, attended by the 9 ASFA Partners recruited to search nationally held collections.

The objective of the Stage 2 activities was to identify research (published and unpublished documents) held in national/ local collections that had not been identified in stage one. Participants searched library catalogues, institutional repositories and websites, as well as national journals and contacting authors. The trainings ensured participants understood and could apply the search methodology in order to identify research, as well as providing a platform to ask questions, share information and network. Internet connectivity was at times problematic, however resources were provided in the form of documents and videos that could be downloaded. Thanks to the translation and liaising skills of Arame Keita, the group formed a strong network despite the meetings being held online and different languages in the region. This helped to foster a collaborative and encouraging environment where each consultant felt motivated to complete their work.

Each consultant produced a spreadsheet with research produced by authors affiliated to institutions in their country. The data was then merged with the research identified in stage one to form a comprehensive inventory of research held both online and in national collections.

Preliminary Results

The below tables present the number of documents identified by this project during stages one and two, broken down by publication year and document type. This work

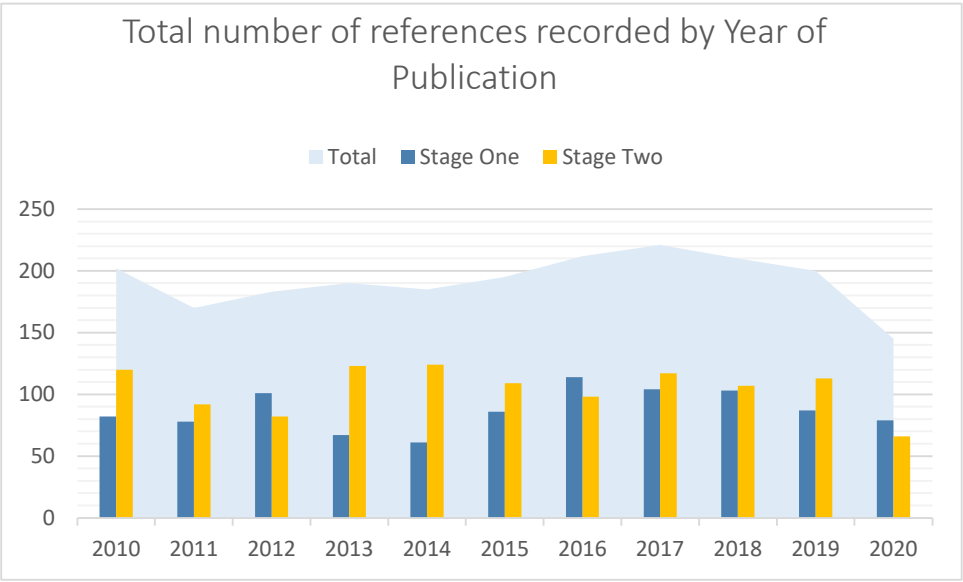
represents only the preliminary results, a full bibliometric analysis of the research inventory is due to be published on the CECAF-PESCAO website in February 2021. This will also include analysis of author gender which is often overlooked due to the difficulty of recording this information.

Number of documents identified in Stages One and Two:

Country	Number of references: Stage One Online Resources	Number of references: Stage Two: Nationally held collections	Total
Benin	62	155	217
Cote D'Ivoire	24	46	70
Ghana	53	126	179
Guinea	18	125	143
Mauritania	56	45	101
Morocco	154	124	278
Nigeria	259	128	387
Senegal	231	290	521
Spain	196	179	375
Totals	1053	1218	2223

The above table demonstrates that the majority of documents were identified during stage two, which focused on searching nationally held collections to identify research. In Guinea, Benin and Ghana, the difference was most profound with 87%, 71% and 70% of research identified through national collections rather than online, respectively. Nigeria, Mauritania, Morocco and Spain each had slightly more research identified online during stage one than offline during two. There are a number of possible reasons for these differences, such as: storing material offline/ library catalogues only; lack of access to technologies and resources to deposit research on repositories; publication bias being more prevalent in some countries in the region than others; individual reasons in the way the data was collected during the project (errors in searching/ overlooking research). Further work will be undertaken to understand these reasons.

Number of documents by year of publication



The above graph shows the number of documents recorded on the inventory for all nine countries, organised by year of publication. The graph shows that in the years 2010, 2011, 2013, 2014, 2015, 2018 and 2019, more research was identified from national collections rather than online sources, with the biggest differences in 2013 and 2014. Since 2015, the gap has narrowed and in 2020 slightly more research was identified using online sources (79 documents) rather than national collections (66 documents). The overall number of documents identified does not vary significantly during 2010 – 2019, the drop in number of documents in 2020 can be explained by the searches being conducted from September – November, i.e. before the end of 2020.

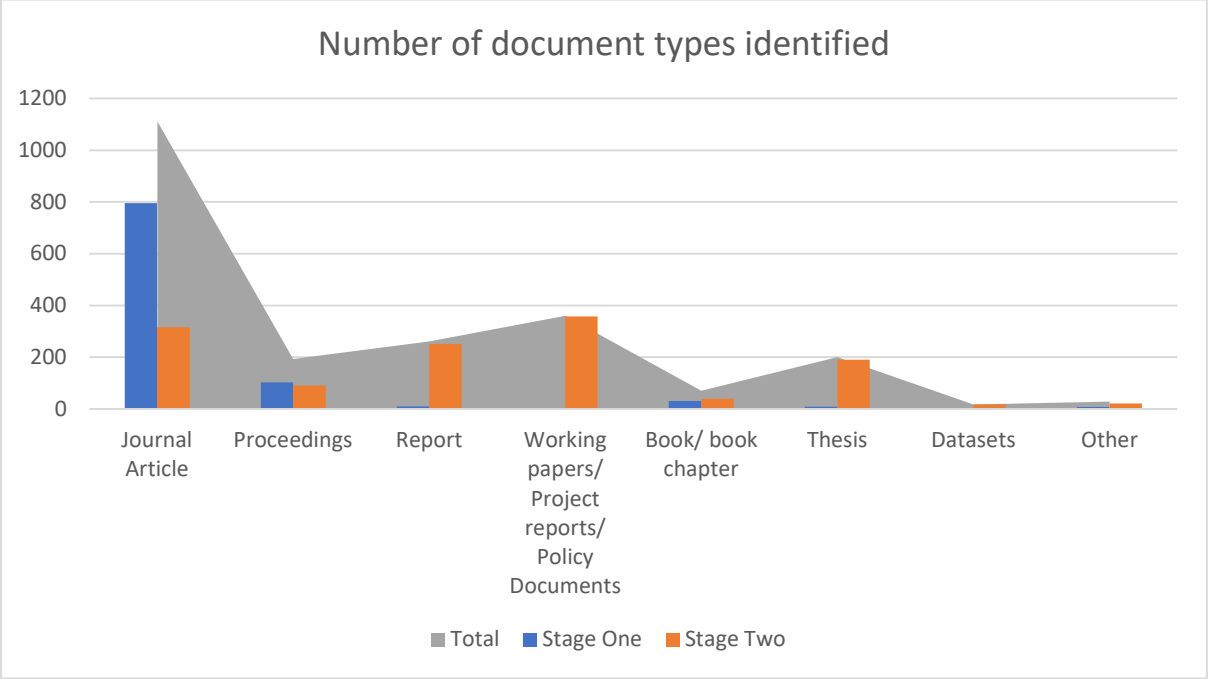
The two tables below give a breakdown of the number of references identified for each country:

Number of documents by Year of Publication (Stage 1)											
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Benin	2	0	4	9	3	5	7	8	11	6	4
Cote d'Ivoire	3	3	3	2	1	1	2	3	1	2	3
Ghana	2	2	3	4	5	5	6	9	7	10	10
Guinea	2	3	1	0	0	2	4	4	0	0	1
Mauritania	4	4	10	2	6	4	4	16	2	1	3
Morocco	10	10	17	5	7	10	25	15	26	16	13
Nigeria	35	34	25	26	12	21	21	26	20	21	16
Spain	8	9	11	6	8	14	9	5	12	11	8
Senegal	16	13	27	13	19	24	36	18	24	20	21
Total	**82**	**78**	**101**	**67**	**61**	**86**	**114**	**104**	**103**	**87**	**79**

Number of documents by Year of Publication (Stage 2)											
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Spain	35	24	20	11	21	12	15	12	9	7	11
Guinea	10	5	7	6	6	11	12	16	7	15	20
Ghana	6	8	7	9	9	9	10	6	18	12	11
Benin	11	10	15	9	11	11	11	13	7	5	4
Nigeria	16	15	11	4	16	1	10	18	14	19	4
Cote d'Ivoire	4	1	4	3	2	3	2	7	10	6	4
Morocco	13	16	8	7	11	35	5	33	7	8	6
Mauritania	1	3	1	6	2	5	5	3	5	9	5
Senegal	24	10	9	68	46	22	28	9	30	32	1
TOTAL	**114**	**84**	**75**	**114**	**115**	**100**	**88**	**111**	**89**	**101**	**55**

Document Types identified during stages one and two

The below graph illustrates the total number of document types identified during the project, as well as a breakdown of the numbers identified during stage one and stage two. As can be seen, Journal Article is the most numerous document type overall (1,111 journal articles identified) however the majority of journal articles were identified during stage one, searching of online sources. When national collections were searched during stage two, a wider variety of document types were identified, with working papers, project reports and policy documents the most numerous document type. Also of interest, only 9 theses were identified during the online search, whereas 191 theses were identified when searching national collections. This indicates dissertations and theses are likely to be an underused resource and more should be done to ensure the time, expertise and knowledge that goes in to producing these theses is not lost.



	Journal Article	Proceedings	Report	Working papers/ Policy Documents	Book/ book chapter	Thesis	Datasets	Other
Stage One	795	103	10	2	31	9	0	8
Stage Two	316	90	251	358	40	191	17	21
Total	1111	193	261	360	71	200	17	29

As mentioned, a full bibliometric analysis is underway which will investigate the above results in more detail, as well as analysing other data recorded in the inventory. The data we have collected in the inventory extends to author affiliation and collaboration with other institutions, both in the region and internationally. Results from this analysis so far indicate that France and Canada are the most common countries for authors from the CECAF region to collaborate with. Also being analysed are: access rights (open or closed access), whether a document would be classified as grey or primary literature, and; whether the source title is classified as a predatory journal. This last point has produced interesting results with a surprising number of references coming from predatory journals.

Summary and recommendations for future work

Whilst an in-depth bibliometric analysis of the inventory is still in progress, we are able to present preliminary conclusions and recommendations for future work. The preliminary results so far indicate that there is a wealth of marine fisheries research conducted in the CECAF region that is underused, particularly by international researchers, due to its inaccessibility online. The reasons for research being inaccessible online warrant further investigation to understand whether lack of access to technologies; lack of resources/ staff time; lack of skills or awareness are factors. The number of reports, working papers, and in particular dissertations and theses produced by authors in the region make clear that there is significant marine fisheries research capacity and output in the CECAF region. We believe it is the work of knowledge managers, and partnerships such as ASFA, to help increase the findability of these resources, providing training and access to technologies to help overcome barriers. Further analysis of the inventory may provide insight into the reliance on publishing in predatory journals, uncovering publication bias against authors in the region or other barriers to publishing in accredited journals. We look forward to sharing the full results of our analysis and welcome feedback and assistance from interested parties on this project.

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Your 7 steps to sustainable data

1. **Prepare your data**
   Select the relevant data files. Check them for privacy aspects and file format against the guidelines issued by DANS.

2. **Go to EASY**
   Log in at https://easy.dans.knaw.nl. If you are new to EASY, you will have to register for an account first.

3. **Start the deposit procedure**
   Go to 'deposit your data', select your discipline and click 'start deposit'.

4. **Documentation and access level**
   Describe the dataset and indicate whether it is open access or whether access restrictions apply.

5. **Upload your data files**
   Select your data files and click 'upload dataset'.

6. **Submit your data files**
   Accept the licence agreement and send your dataset to DANS by clicking the 'submit' button.

7. **Publication by DANS**
   DANS will verify the dataset and publish the description you made. Your data have now been sustainably archived and will be accessible to others on a permanent basis under the conditions you specified.

Grey Literature Resources generate and drive Awareness to a Circular Economy: An Explorative Research Project

Dominic Farace and Jerry Frantzen, GreyNet International

Abstract

In September 2019, the first seminar of its kind dealt with grey literature and a circular economy i.e., an economic system aimed at eliminating waste and the continual use of resources. The information compiled in advance of that seminar and the interest shown by the participants provide the lead-up to this study.

Grey literature resources are a significant part of the information industry and like other industries in a circular economy such as textile, construction, and logistics, the role and value of these resources must be understood and demonstrated. This study looks at how grey literature resources are a vehicle for other industries in a circular economy, and at the same time how they themselves are part of an industry, which drives a circular economy.

This study first sets out to gain insight into the opinions of GreyNet's community of practice with regard to a circular economy and to determine if there is consensus. This is carried out via an online community-based survey. The study will further look at the way in which grey literature resources can be seen as a vehicle for other industries in a circular economy. This part of the study is carried out via a search of the literature based on a sample of a number of industries. Together, these results will allow us to explore good practices in generating societal awareness to a circular economy and in doing so, drive awareness to the value of grey literature resources.

As with any explorative research, the outcome has yet to be fully defined. Nevertheless, it is expected that the findings of the survey will indicate a sufficient level of consensus within GreyNet's community of practice. And, the search of the literature will demonstrate that grey literature can be seen as a vehicle for other industries in driving awareness to a circular economy. Nevertheless, differences in the volume of references to grey literature may occur depending on the type of industry included in the sample.

Introduction

Almost two years ago at a social event, the conversation turned to circular economy. A term I had heard in passing, but which I chose to read up on later that evening. Half way through the wiki article, the association of terms used in grey literature became apparent. When I looked at the references, what also became apparent were the number of references from the grey literature. Last year Jerry Frantzen, my co-author and I presented a one-of-a-kind workshop on grey literature and circular economy[1]. The takeaway from that event was the lead up to this research project.

Before proceeding further, the definition of circular economy used in this study, which is shared in great part by both the Ellen MacArthur Foundation[2] and Wikipedia reads as follows: "Circular economy is an economic system aimed at eliminating waste and the continual use of resources. Circular systems employ among other means the reuse and sharing of resources. This regenerative approach is in contrast to the traditional linear economy, which has a 'take, make, dispose' model of production.[3]"

Project Goals and Method

The goal of this research project was to gain insight into the opinions of GreyNet's community of practice[4] with regard to circular economy and to determine if there is consensus. Further, the goal was to explore the way in which grey literature resources can be seen as a vehicle for other industries in a circular economy. In so doing, it would also corroborate grey literature's role as a driver in the information industry. The method of approach in this study was twofold: first to construct a questionnaire and

distribute it online among GreyNet's community of practice. And secondly, to carry out a web search of a sample of industries engaged in circular economy.

Survey Questionnaire

In formulating the ten questions that comprise the instrument used in this study, a short list of terms and concepts were drawn from the workshop on Circular Economy and Grey Literature held in the Summer of 2019. Each of the terms and concepts selected would have a particular connotation and use in both the fields of grey literature and circular economy. From the list that was compiled, nine of the terms and concepts were selected and further elaborated. This aided in formulating the nine close-ended survey questions. The tenth question was open ended. The final edited version of the online questionnaire[5] was then entered in SurveyMonkey and a link was generated for online distribution.

Survey Population and Respondents

The survey was online accessible for a four-week period in March of 2020. GreyNet's Distribution List, its Social Media[6] (namely Facebook and LinkedIn) as well as the GreyGuide[7], GreyNet's Web Access Portal and Repository comprised the population used in the study.

Survey Population	Survey Respondents	% Questions Answered
GreyNet's Distribution List, Social Media, and Web Access Portal	72	93.75%

This resulted in 72 survey respondents that answered a near 94% of the survey questions. While the population of the survey was not strictly controlled, all of the survey recipients are known to have some affiliation with grey literature. It can be noted that one-third of the respondents provided their contact details solicited in the final question of the survey.

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
Q1	45	19	7	0	0
Q2	40	26	4	1	0
Q3	25	28	13	6	0
Q4	18	27	23	4	0
Q5	26	31	13	2	0
Q6	26	29	9	8	0
Q7	44	21	5	0	0
Q8	5	25	32	7	2
Q9	28	35	7	1	1

Table 1: Overview Survey Results

A clear majority of responses were in agreement on seven of the close-ended survey questions dealing with Q1 open access, Q2 loss of information, Q3 information overload and underuse, Q5 persistent identifiers, Q6 knowledge transfer, Q7 accessibility from production through to publication, and Q9 public awareness. A marked uncertainty was found with regard to two of the close-ended survey questions dealing with Q4 a dated mindset and Q8 reusability instead of replicability of research data.

Web Search Procedure

In the second method of approach used in our study, five industries identified with Circular Economy were selected for web-searching – namely: Agriculture, Utilities, Logistics, Textile, and the Automotive industry. Google[8] and Google Scholar[9] were the two web search engines used in the study. It is widely held that the majority of content in Google Search is primarily not controlled by commercial publishing, while Google

Scholar's content is. The search terms that were used both standalone and in combination with one another include: "circular economy", "grey literature", and the five industries mentioned above. The results of the web search were then ranked by their number of hits. For comparative purposes, the web searches first carried out in June 2020 were again repeated in October 2020.

GOOGLE *(Primarily not controlled by Commercial Publishing)* ***June 10, 2020***

"circular economy" 7.610.000	"circular economy" **and** "A.B.C.D.E."	Ranking	"circular economy" **and** "A.B.C.D.E." **and** "grey literature"	Ranking	"grey literature" 1.520.000
Industries:					
A. Agriculture	4.220.000	1	9.250	1	
B. Utilities	362.000	5	4.380	3	
C. Logistics	1.660.000	2	5.120	2	
D. Textile	546.000	4	2.100	5	
E. Automotive	718.000	3	4.090	4	

GOOGLE *(Primarily not controlled by Commercial Publishing)* ***Oct. 5, 2020***

"circular economy" 9.370.000	"circular economy" **and** "A.B.C.D.E."	Ranking	"circular economy" **and** "A.B.C.D.E." **and** "grey literature"	Ranking	"grey literature" 1.700.000
Industries:					
A. Agriculture	8.480.000	1	15.600	1	
B. Utilities	420.000	5	3.790	5	
C. Logistics	3.580.000	2	11.400	2	
D. Textile	643.000	4	8.070	4	
E. Automotive	1.310.000	3	8.990	3	

Table 2: Google Search Results

In June of 2020, a Google Search of the term "circular economy" produced over 7.6 million hits. The same search in October 2020 increased to over 9.3 million hits. In June of 2020, a Google Search of the term "grey literature" produced over 1.5 million hits. The same search in October 2020 increased to 1.7 million hits. When the term "circular economy" was combined separately with each search term corresponding to the five industries in our study, results indicated that Agriculture and Logistics had the highest number of hits respectively. And, the number of hits for each of those two industries more than doubled between June and October of 2020.

When the search term "grey literature" was then further added to the Google Search string results show that {"circular economy" + "agriculture" + "grey literature"} yielded 9250 hits in June and 15600 hits in October. An increase of 6350 hits. The search {"circular economy" + "logistics" + "grey literature"} yielded 5120 hits in June and 11400 hits in October. An increase of 6280 hits.

GOOGLE SCHOLAR *(Primarily controlled by Commercial Publishing)* ***June 10, 2020***

	"circular economy" 88.000	"circular economy" and "A.B.C.D.E."	Ranking	"circular economy" and "A.B.C.D.E." and "grey literature"	Ranking	"grey literature" 144.000
Industries:						
A. Agriculture		13.900	2	392	1	
B. Utilities		5.360	5	107	5	
C. Logistics		18.100	1	274	2	
D. Textile		11.400	3	125	4	
E. Automotive		9.120	4	162	3	

GOOGLE SCHOLAR *(Primarily controlled by Commercial Publishing)* ***Oct. 5, 2020***

	"circular economy" 101.000	"circular economy" and "A.B.C.D.E."	Ranking	"circular economy" and "A.B.C.D.E." and "grey literature"	Ranking	"grey literature" 162.000
Industries:						
A. Agriculture		32.800	1	481	1	
B. Utilities		5.860	5	120	5	
C. Logistics		19.700	2	347	2	
D. Textile		12.400	3	148	4	
E. Automotive		10.100	4	189	3	

Table 3: Google Scholar Search Results

The results of our search in Google Scholar are described here in much the same way as with the Google search. In June of this year, a search in Google Scholar for the term "circular economy" produced 88,000 hits. The same search in October increased to over 100,000 hits. In June, a search in Google Scholar of the term "grey literature" produced 144,000 hits. The same search in October 2020 increased to 162,000 hits. When the term "circular economy" was combined separately with each search term corresponding to the five industries in our study, results indicated that Agriculture and Logistics also had the highest number of hits. However, the ranking in June, where Logistics was first and Agriculture was second turned the other way around in October. While both of the two industries showed an increase, the increase for "Agriculture" + "Circular Economy" was 58%, while the increase for "Logistics" + "Circular Economy" was 8%.

When the search term "grey literature" was then further added to the Google Scholar search string results show that {"circular economy" + "agriculture" + "grey literature"} yielded 392 hits in June and 481 hits in October. An increase of 89 hits. The search {"circular economy" + "logistics" + "grey literature"} yielded 274 hits in June and 347 hits in October. An increase of 73 hits.

Some Concluding Remarks

Results of the survey show a significant level of consensus in GreyNet's community of practice. However, there is an uncertainty regarding the FAIR data principle[10] of reusability juxtaposed to replicability, which requires further consideration. Gathered from comments pertaining to Question 4, the expression 'dated mindset'[11] was not immediately understood.

The Google and Google Scholar searches provide clear indicative results; however, other search engines and databases are needed to corroborate findings. Variance was demonstrated among the five industries in the study with regard to circular economy, and this variance remained when the term grey literature was added to the search

string. Google Search accounted for an average of 7069 hits across the five industries in the study, while Google Scholar accounted for an average of only 235 hits.
In order to better assess the role of grey literature, it is recommended that search by type of publication and/or publishing body also be included. In close, being a part of the information industry, grey literature can be viewed as both a driver and vehicle for other industries in a circular economy.

Project Spinoff

The term circular economy did not appear in any of the survey questions. However, the terms and concepts used in formulating the survey questions are found in both the fields of grey literature and circular economy. Twenty-four of the 72 survey respondents, who chose to provide their contact details were later asked if the survey and survey data[12] had potential for reuse; and if so, how would they envision this in relation to another area of study? Comments from three of the recipients follow: 1. to understand the socio-economic consequences of the FAIR approach, 2. in repurposing data from COVID-19 tests and observations into research guides, literature searches, and informational webinars, and 3. to engage the research community in reflecting and articulating its needs for open sources.

References

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[2] https://www.ellenmacarthurfoundation.org/circular-economy/what-is-the-circular-economy

[3] https://en.wikipedia.org/wiki/Circular_economy

[4] http://www.greynet.org/home.html

[5] Survey questionnaire https://easy.dans.knaw.nl/ui/datasets/id/easy-dataset:161400/tab/2

[6] http://www.greynet.org/home/socialmedia.html

[7] http://greyguide.isti.cnr.it/

[8] https://www.google.com/

[9] https://scholar.google.com/

[10] https://www.go-fair.org/fair-principles/

[11] The dated mindset of the 20th Century is an obstacle in the field of grey literature.

[12] Survey data described in a data paperfile:///C:/Users/GreyNet/Downloads/2020-RGL01-005%20(2).pdf

Practical techniques to enhance the quality of grey literature produced: The case of research posters

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Discussion of grey literature focuses on many topics: examples include classification, archiving, discovery, and dissemination. At Frontinus we focus on the creative processes involved in the production of grey literature.

In particular, we focus on the question of quality. In doing so, we utilise the concept of quality infrastructure (as discussed in our white paper, *Research communication and grey literature: a rising tide)*[1]. We seek to discover or develop techniques and tools that can be incorporated into creative processes in order to, if not guarantee high-quality outcomes, at least make them more probable. We pursue this aim through a variety of means -- most notably, training, mentoring, editing, and the provision of resources.

Context

This paper characterises an example of such work in the School of Technology at the University of Cambridge, UK. In particular, it outlines our work on the development of research posters by doctoral researchers in a constituent of that school, namely the Department of Chemical Engineering and Biotechnology. The main vehicle for such work consists of small-group workshops, supplemented by personalised review of draft papers (typically conducted by email). The work is conducted in English, which is also the language in which the researchers produce their posters. We support this work with resources available in print and online, principally in the form of a protocol entitled 'Writing, designing, and presenting a poster'[2].

Our approach is based on a consideration of typical pitfalls: We ask, ourselves, 'When it comes to designing and presenting posters, (a) what are those things that researchers do, which they shouldn't, or (b) fail to do, which they should?' We then seek to provide practical steps to help researchers to avoid such pitfalls.

By far the most obvious pitfall is over-cramming: it's not at all uncommon to find in a single draft poster sufficient content for several posters.

Because workshops are limited to an hour (or sometimes and hour and a half), we focus on only a few topics, namely (a) the implications of the physical behaviour observed in poster exhibitions, (b) the notion of presentation, and (c) design. A summary of each of these topics is presented, in turn, below.

The topics

Physical behaviour

Consider the ways in which consumers tend to behave during a poster presentation. Often, as they walk around the room or hall, they will maintain some distance between themselves and the posters, only going up close when some poster particularly engages their interest. And, even when they do so, they typically spend rather little time actually reading the poster. And, unless particularly motivated, consumers will tend to remain rather immobile whilst reading: after all, such actions as bending or squatting to read the lower part of a poster rapidly become wearying.

What follows from this? We make five recommendations.

First, place the most important content in the upper half of the poster. That way, most consumers can read it whilst remaining upright.

This often requires, on the part of the creator, disruption of the linear structure of research papers. For example, in papers the conclusion comes last. But on a poster that

would equate to placement low down on the right, where it's less likely to be read. If, as is often the case, the conclusion is important, it makes sense instead to place it near the top. Similarly, in a paper the method section often comes early, after the introduction. But if the method reported is standard, it doesn't merit premium space: it may therefore be relegated to a position in the lower half of the poster.

Second, if the exhibition organiser permits, prefer landscape format to portrait. Doing so means that more content may be placed in the premium space − that is, at what is roughly eye-level for most readers.

Third, make the text instantly accessible. Guide navigation explicitly by using arrows or numbers. Use narrow columns in order to keep lines of text short. Paragraph differently from extended texts such as papers and dissertations: for posters, single-sentence paragraphs are often optimal.

Behind all of these recommendations lies the following argument: a poster is a form of communication; generally, the only thing that matters in a communication is what is actually communicated; the value of a communication resides only in what the consumer takes from the communication. It follows that merely mentioning something or including some piece of content has no value in its own right: indeed, if such inclusion contributes to over-cluttering, it will have a negative value. Thus less can be more.

Presentations

When considering the nature of a poster presentation, the key point to grasp is that a presentation involves more than just the poster. Often, when researchers are required or invited to present a poster, they will in their heads reduce the task to 'Needing to produce a poster'. Our message is, in contrast

- poster presentation ≠ poster
- poster presentation > poster

We suggest that, to fully exploit the opportunity of a poster presentation, three components should be utilised, namely (1) the poster itself, (2) the researcher (as a participant in conversation), and (3) a take-away.

Consideration of the role of the researcher as an interlocutor requires the identification of what kinds of things the researcher can say to consumers in order to add value, rather than merely repeat content from the poster. Thinking this through can, incidentally, help researchers to declutter posters: 'I don't need to put that point on the posters: instead, I can talk about it when appropriate'.

The take-away can be as minimal as a business card. More extensive take-aways, however, such a folded sheet of A3, can often add considerable value – by, for example, providing an abstract, supplementary information, and links and references. Such content can also be published online, supported by a QR code.

The existence of such options can again help researchers to declutter their posters.

The components of the presentation beyond the poster itself – that is, the researcher and the take-away – can prove valuable in helping consumers with disabilities (for example, those in wheelchairs) to access content.

Design

Our recommendations concerning design focus primarily on principles. The principles of design that we introduce are those covered by Robin Williams in her remarkably helpful how-to book, *The non-designer's design book*[3].

Of these, two prove particularly useful in this context. First, alignment: we recommend to researchers that whenever they place a new component (for example, a box containing a figure) onto a poster, they ensure it aligns in at least one way (vertically,

horizontally, or even diagonally) with some other component. This helps ensure that the layout looks professional.

Second, proximity: space can be used semantically so that items close to each other in meaning are placed close to each on other on the poster and items little related in meaning can be placed at a distance to each other. For example, researchers often place such information as job titles and email addresses at the top a poster, immediately under the title – yet this makes little sense, since the meaning of such information is usually quite distinct from that of the title. Instead, such items can be placed at a distance from the title, ideally in non-premium space (for boring-but-necessary information) near the foot.

We also encourage researchers to consider consumers' needs arising from visual impairment. For example, we provide a link to an app designed to identify such potential difficulties in a design those concerning colour blindness.

Conclusion

The single most evident contribution that the work described above makes to enhancement of the quality of posters concerns the 'less is more' point: as, in the light of the training, researchers revise their poster designs, they typically reduce the amount of content, often markedly.

We should note that apply the thought-process identified above – that is, first identify typical pitfalls and then think of ways to anticipate them – for work on several other forms of grey literature – notably abstracts, dissertations, email, and slide decks.

In the context of the work of the grey literature community as a whole, we suggest that embedding quality infrastructure into the creative processes that produce grey literature provides a kind of leverage: the stronger the quality infrastructure, the higher the quality of grey literature and the greater the value of those processes –classification, archiving, discovery, and dissemination, and so on – designed to support it.

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The Grey-side of Audio Archives

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Abstract
Archives often include documents that can hardly be considered publications or grey literature as such, yet they maintain their documentary value and play a role of primary sources for the specialists. These documents, indeed, can help archivists to reveal the sedimentation process of the archive itself and to preserve the authentic context of the documentary production. They also appear to be very useful for the community of researchers and scholars. This happens more frequently with oral archives which include 'non-conventional sources', thus bringing together audio documents, fieldworks notes, correspondence, slipcases, analogic compact cassettes or open reels. At the cross-road of two disciplines, Archival Science and Grey Literature, this paper aims to argue the applicability of the concept of grey literature to this wide range of documentary materials, by showing the experience of Archivio Vi.Vo, a regional project aiming at building a model for archiving, preserving, managing and disseminating audio documents.

1. Introduction

1.1. The background: audiovisual heritage

The audiovisual heritage of the twentieth century is at risk of being lost. Both analogue and digital documents are in danger: the former because of carrier degradation and playback device obsolescence, the latter because of the hardware and software obsolescence as well as the rapid evolution of standards and formats. On the other side, knowledge conveyed by oral culture may be as disseminated, reliable and accessible as written resources, counteracting the negative effect of technological obsolescence. Looking ahead and careful planning can minimize the repercussions on memory preservation.

1.2. Setting the problem: Archival Science, oral archives and Grey Literature

Why would Archival Science matter to Grey Literature? It appears that this question has a relevant place in the domain of digital archives, as we try to argue in the present paper. Building a digital archive entails the creation of different types of digital documents: i) documents of the archive itself; ii) documents about the archive. These are deliverables, technical papers, sketches and other different typologies of documents falling uncontroversially into different types of grey literature. They all appear to be extremely useful for supporting these projects as well as studying the evolution of the archive itself. In addition, they often play a role of primary sources for the specialists and prove to be useful in helping the archivists to reveal the sedimentation process of the archive itself and preserve the authentic context of the documentary production. Finally they also appear to be beneficial for the community of researchers and scholars in their studies.

The picture become even more complex in the realm of audio documents and oral archives, that preserve, organize and make available such documents. Oral archives appear to be rather complex and delicate, mainly because of the multifactor 'fragility'

that characterizes audiovisual heritage (see Calamai, Casellato and Stamuli, forthcoming).

In fact, the archival treatment of audio documents deals with 'oral sources'. Those kinds of sources are at the crossroads of several domains of knowledge and disciplines, each with its own jargon: oral history, linguistics, anthropology, ethnomusicology, digital humanities. In archival science, 'oral sources' are considered 'new sources' or 'not conventional sources' (Carucci, 1993; Mulè 2005). What makes audio documents different from prototypical archival and documentary records is mainly their hybrid nature, characterized by a dichotomy between the 'content' (the audio signals) and the carrier, that can potentially contain more than one audio recording, even different kinds of audiovisual records. The digitisation process of analog audio recordings for their preservation (Miliano, 1999) provides additional material that describes the operations undertaken. Doing so is essential for reporting the history of the document's transmission.

Given this background, the research question raised in this paper can be summarised as follows: "how much grey" is this wide range of documentary materials?

1.3. The Case Study: Archivio Vi.Vo.

Archivio Vi.Vo. is an Italian regional project supported by Regione Toscana, whose aim is to explore methods and services for long term preservation and secure access for audiovisuals (Calamai et al. 2020; Stamuli et al., in press). It constitutes a pilot study dealing with the description and cataloguing of Caterina Bueno's[1] audio recordings (digitized during the PAR-FAS project *Grammo-foni Le soffitte della voce*, 2010-13) composed of about 450 carriers (audio reels and compact cassette tapes corresponding to nearly 700 hours of recording). The services for long-term preservation and access are developed within the framework of CLARIN-IT, the Italian counterpart of the European Research Infrastructure for Social Sciences and Humanities, CLARIN-ERIC. The Italian node of the European data-center federation, ILC4CLARIN, offers long-term solutions and technology services for sustaining, archiving, deploying, connecting, and analyzing linguistic data. By means of *Archivio Vi.Vo*., Caterina Bueno's audio recordings and its metadata will be systematized under the CLARIN-IT domain, through an experimental and cross-disciplinary approach to preservation, management and access to audio-video data, aimed at adopting the model and the high-performance computing and archiving services of the GARR network infrastructure, built along the CLOUD paradigm. This model will be disseminated to the scientific community interested in managing audiovisual records and will make it possible for the general public to access the oral sources produced in the territory. The project is thus meant to support and advance activities regarding this topic in the CLARIN-IT consortium and the CLARIN infrastructure.

2. Research approach and first outcomes

One of the main objectives of *Archivio Vi.Vo* is the creation of a model for dealing with issues of preservation, archiving, management and dissemination of audio documents, adoptable by institutions, archives and researchers. In order to achieve this objective, grey literature assumptions have a prominent role.

Starting from the very beginning of the archive's creation, the developers should collect, analyze and make accessible to professional and non-professional audience (1) the overall set of different documents related to the production of the audio records, and

[1] Caterina Bueno (1943-2007) was an Italian ethnomusicologist and singer, highly appreciated for its cultural value. Her work allowed the collection of many Tuscanian and central Italy's folk songs that have been passed down orally from one generation to the next until the 20th century.

(2) the documents concerning the design and development of the platform for the long-term preservation and access to the audio archive.
Concerning the former, in the arrangement phase of the archive itself, archival science prescribes to carry out a careful analysis and survey of the archival documentation. In fact, if we conceive the archive not as a dead entity, but as an evolving reality we need to reveal the sedimentation process and give the documents their authentic context of production, shaped by the activities of the producer of the archive itself. This is particularly important for 'not conventional sources' as oral sources are. In Caterina Bueno's sound archive, everything reveals the archive sedimentation process and lends the appropriate and authentic context of production to the audio records: her fieldwork notes, her correspondence, the slipcases of compact cassettes and of the open-reels that she wrote, her diaries, the newspaper clippings she collected, the numbering labels that she used, etc.
Archivio Vi.Vo. makes all this data fully retrievable, thus making audio records fully understandable by adopting both bibliographic and archival recommended standards.

The second kind of grey literature documents considered here belongs to the well-known typology of "technical documents" (Pejšová, 2011). The production of these documents is strictly related to the software engineering field, and in particular, to the adopted software process model (sometimes called Software Development Life Cycle model). There are no universal software engineering methods that are suitable for all systems and all companies (Sommerville, 2016) and the software process model has to be chosen considering the kind of application will be developed. The complexity of the *Archivio Vi.Vo.* infrastructure prevents a development from scratch, but, as most of the complex business systems, it has to be developed configuring existing systems and integrating new functionalities. For this reason, within the project, we adopt the process model that Sommerville defines as "integration and configuration", in order to re-use and adapt existing software. Each task of this model has different outcomes: products or deliverables. The latter can be reports, models, sketch, UML schemas, system and user documentation (which are precious for the development, maintenance and possible extension of the software since the early stage of its development, as well as for other similar projects), *i.e.* a vast kind of material that will be published within the infrastructure itself and offered to the scientific community as grey literature.
From this respect, special attention is paid to the technical reports produced inside the project: that is, the description of Caterina Bueno's archive, its archival structure, the metadata scheme, the glossary (in order to have a common vocabulary inside the research project), and the legal documentation related to privacy and copyright. Conversely, certain members of the project staff are producing a rather different type of technical reports, which are useful inside the project in order to document the activities of every single post-doc researcher, for preparing the hand-over from one researcher to another, for communicating accurately through a cross disciplinary project and to express to others the path on which the project is moving on. According to GL, different levels of accessibility and different types of public can thus be envisaged: i) open, for the general public (e.g., the glossary, the structure of Caterina Bueno's archives), and ii) restricted, for internal use (e.g., the final reports of each post-doc researcher involved in the project).

3. Final Remarks

As Serini (2003) points out, among the archival documents there are numerous materials which, according to their publication status and the interest they can have among specialists, can be quite rightly grey literature. The cross-disciplinary approach adopted by the *Archivio Vi.Vo.* project will bring to the forefront the technical documentation and the archival materials as 'grey literature', as data distinguished by content and type, but united by the objectives of research, organization and dissemination. According to Serini, what makes a wide range of documents 'grey literature' is the combination of different, but interwoven, layers such as their production (characteristic of a particular research endeavor or to an organization) and the type of distribution.

Archivio Vi.Vo. aims at producing a digital ecosystem with audio recordings at the heart. The unconventional documentation produced in the realm of audio archives will be treated in the light of grey literature, conceived as a product in relation to a service, a vehicle of direct communication, participatory democracy, transparency and organisational clarity, and the recovery of memory (Sardelli 2000).

At the same time, the building itself of such an ecosystem produces a flood of different and diverse objects which might be undisputedly inserted inside the GL approved taxonomy. On the other hand, it cannot be excluded that the GL taxonomy might also benefit from the work carried out by *Archivio Vi.Vo.* given the cross-disciplinarity and multimediality of audio archives.

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50 YEARS OF INIS

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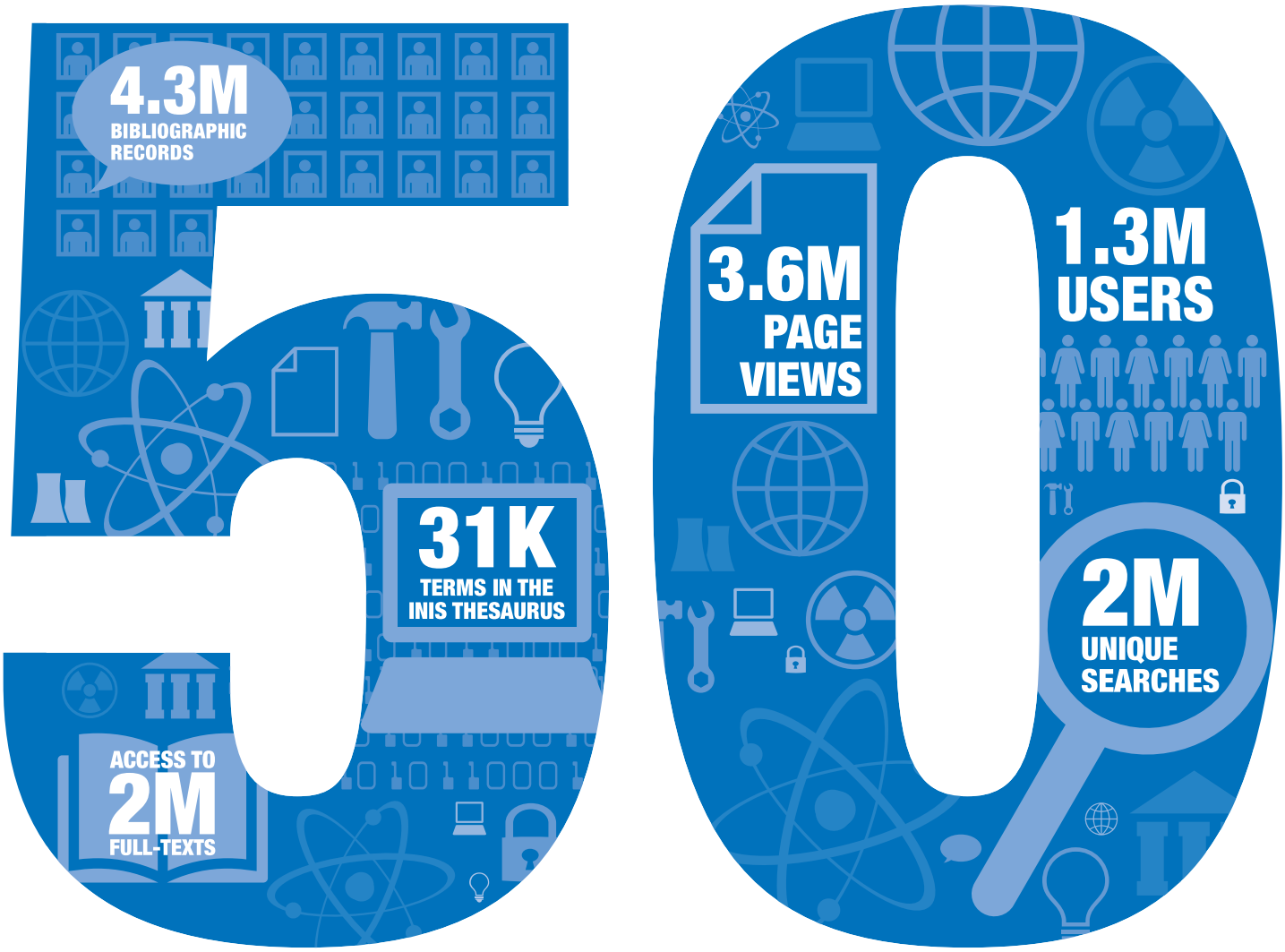

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International Nuclear Information System (INIS)
50 Years of Successful Contribution to Nuclear Science and Society

Dobrica Savić, Nuclear Information Section, IAEA

Abstract

INIS was established in May 1970, as a mechanism to provide access to a comprehensive collection of references to the world's nuclear literature. It has grown from a modest 25-member endeavour to a unique global information resource with a membership of 132 countries. INIS maintains a repository of over 4.4 million bibliographic records, of which 2 million are full text. In 2020, 1.7 million unique visitors made over 2.5 million searches, viewing 4 million web pages.

This paper discusses how INIS operates, the role of its members, the importance of international cooperation, its contribution to nuclear science, its information sharing goals, and the benefits to society of open access to nuclear information.

Keywords: *INIS; nuclear information*

Introduction

The onset of the cold war in 1947 ushered in an era of fear and uncertainty in nuclear technology. President Dwight D. Eisenhower's *Atoms for Peace* speech to the UN General Assembly in 1953 spurred on the founding of the International Atomic Energy Agency (IAEA) in 1957. The Statute of the IAEA recognizes the need to "…foster the exchange of scientific and technical information on peaceful uses of atomic energy". Thus, with the IAEA Board of Governors approval, INIS was established in May 1970 as a mechanism to provide access to a comprehensive collection of references to the world's nuclear literature.

INIS has grown from a modest 25-member endeavour to a unique global information resource with a membership of 132 countries. It maintains a repository of over 4.4 million bibliographic records, of which 2 million are full text. In 2020, 1.7 million unique visitors made over 2.5 million searches, viewing 4 million web pages.

The peaceful use of atomic energy brings numerous benefits to society. Nuclear technology is used almost everywhere on a daily basis, particularly in the areas of health, environment, water, industrial applications, food and agriculture. INIS offers access to a multitude of documents, reports, articles, and other papers related to science and nuclear technology — a veritable treasure trove for scientists, researchers, government administrators, students and many others. The unique subject area and the sheer volume of information offered by the INIS repository represents a major resource of nuclear information, technological developments and scientific discoveries.

While it is not possible to include all of INIS' achievements throughout its 50 years, this paper will concentrate on the creation of INIS, how it functions, its goals, and its current key role as a global resource of nuclear information.

What is INIS

INIS, as part of the IAEA, is one of the world's largest and most comprehensive repositories of published literature in the field of nuclear science and technology. Operating under special membership arrangements, INIS, currently comprising 132 countries, is a collaborative effort. INIS Liaison Officers (ILOs) are designated by their government authorities and are responsible for collecting their national literature and preparing input to the INIS repository, disseminating information contained in INIS products, and promoting INIS within their national boundaries. Preservation and dissemination are centralized within the INIS Secretariat in Vienna.

The INIS repository contains bibliographic references and full-text documents of conventional and non-conventional (grey) literature, including scientific and technical reports, conference proceedings, patents and theses.
INIS subject scope covers all areas of IAEA activities, including 50 related categories. The highest areas of input can be seen below (Fig. 1).

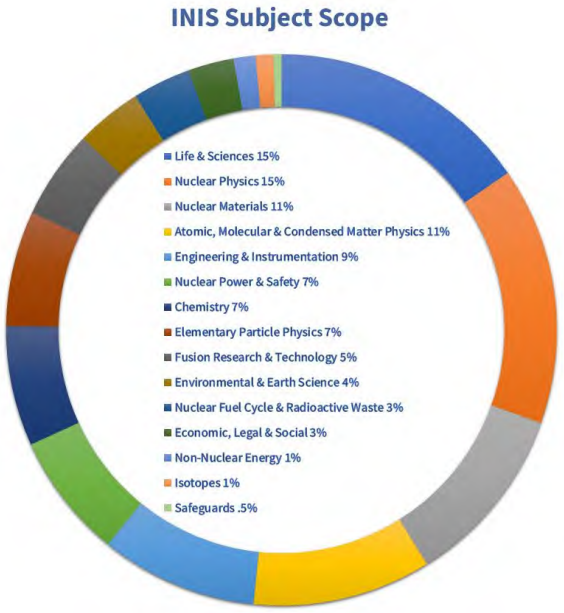

Figure 1: INIS main subject areas

INIS goals

INIS' mandate under the IAEA is to:

- foster the exchange of scientific and technical information on the peaceful use of nuclear science and technology
- collect, process, preserve and disseminate nuclear information
- increase awareness in Member States of the importance of maintaining efficient and effective systems for managing nuclear information resources
- assist Member States with capacity building and training
- provide information services and support to the IAEA and its Member States

INIS also maintains a multilingual thesaurus in Arabic, Chinese, English, French, German, Japanese, Russian and Spanish, providing translations of thousands of technical terms that help navigate and search the collection.

INIS activities are organized in cooperation with its Member States. In addition to regular operational contact with ILOs, consultative meetings take place biennially to discuss policy issues and the overall direction of INIS. The main activities of INIS include:

- Information collection
  - Collect and process bibliographic metadata and full texts of nuclear literature published in IAEA Member States
- Information preservation
  - Electronically preserve non-conventional or 'grey' literature, such as nuclear-related documents, policy and technical reports, and other full-text publications from Member States and international organizations
- Information sharing
  - Ensure free access of the INIS collection to Internet users around the world
- Nuclear knowledge organization

- Create and maintain the INIS Thesaurus as a major tool for describing nuclear information and knowledge in a structured form

- Capacity building
  - Assist INIS members in improving their effectiveness in nuclear information management

Creation of INIS

With an initial 25 members, the collaborative effort to collect nuclear literature in 1970 was modest — 3950 records were entered into the database in the first year. A seemingly small step which marked a significant beginning for the leading global nuclear information system that INIS would become.

Never had such a geographically and linguistically diverse group of nations cooperated to offer, from a central repository, free, easy to find, and trusted information to scientists, researchers, information specialists, students, government officials, and other users. Initially, the inputting process was tedious and required a lot of manpower. Member States would mail paper documents to the IAEA headquarters in Vienna, where they would be photographed and converted to microfiche. Afterwards, INIS staff would check the incoming information, combine it into a single computer-readable file and distribute it to Member States as machine-readable tapes and semi-monthly abstracting journals.

INIS today

Thanks to the continued cooperation with its ever-growing number of global members and the implementation of innovations in technology throughout the years, INIS has seen dynamic growth in the number of records input to its repository —currently 4.4 million records. Over 100,000 new records are added each year. Improvements in technology include digitalization, the deployment of modern databases and search engines, automated classification, artificial intelligence and machine learning, and harvesting. Figure 2 shows the evolution of records input by country over the last 50 years.

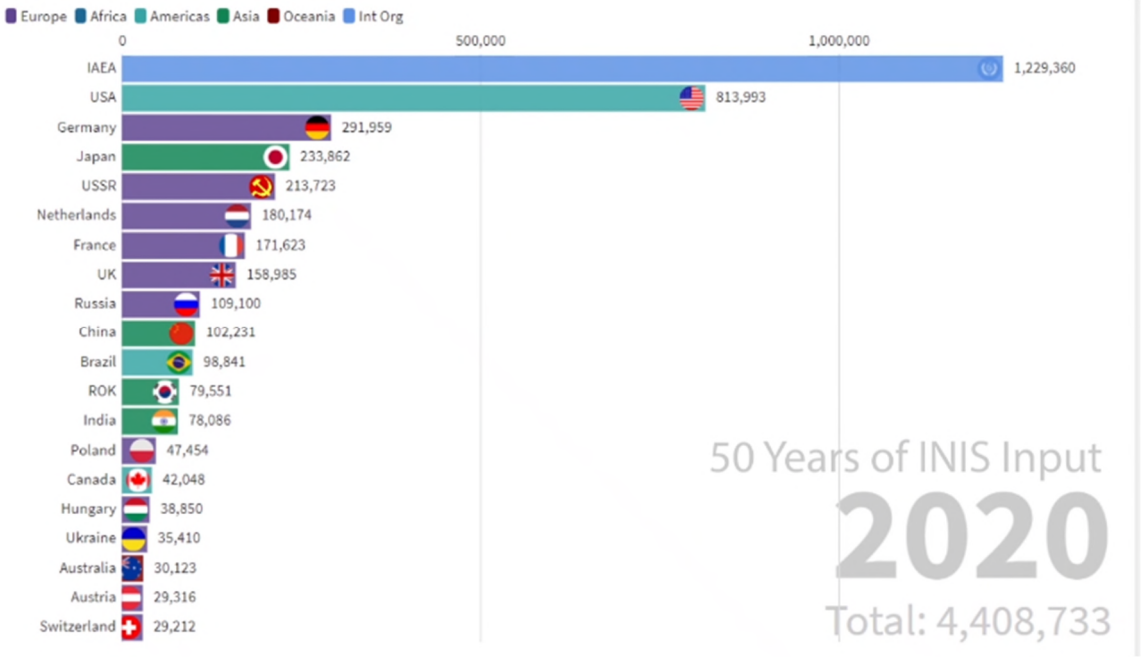

Figure 2: 50 years of INIS input

One of INIS' greatest assets is its collection of more than 2 million full text documents. These can be downloaded directly from INIS servers or through URL or DOI links provided as a part of the INIS bibliographic record.
Another important characteristic of INIS is its open and free accessibility and availability. Statistics show that the repository has been accessed from every corner of the world (Table. 1). Its target audience includes researchers, students, government officials, journalists, and the general public.

LAST 10 YEARS	
1. United States	11. Australia
2. India	12. Russia
3. United Kingdom	13. Italy
4. Germany	14. Pakistan
5. Japan	15. Indonesia
6. Canada	16. Turkey
7. Korea, Republic of	17. Malaysia
8. Brazil	18. Spain
9. France	19. Philippines
10. Iran	20. Egypt

Table 1: Top 20 countries of users in last 10 years

INIS has a proven record as an excellent tool for the preservation of nuclear information. IAEA Member States have been able to recover from INIS valuable information that has been lost or damaged. One of these success stories is the Yerevan Physics Institute (YerPhi) in Armenia, whose physical collection had been damaged during storage. Thankfully, the information had been digitally preserved in the INIS repository making it possible to not only recover the information, but to set up a dedicated website linking to the documents in INIS.

Challenges and Opportunities

The challenges that INIS faces today can also be opportunities in its role as a key player in the world of information sharing and preservation.
The biggest challenge INIS faces are from Google and Google Scholar. The Google challenge is two-fold. The first challenge is external, as seen through user statistics — the number of users coming directly to INIS to search for what they need. It is generally assumed that everything can be found by searching Google and therefore not worth further time and effort searching elsewhere. The second challenge is internal — within our organizations — with a reluctance to invest financially in internal information management operations since it seems that everything is already available on the Internet, such as Google.
INIS has benefited from Google Scholar by having all of its documents indexed and made available through their search engine. Still, it should not be forgotten that without INIS having spent 50 years collecting this information, it would not now be widely available and easily accessible. It is important to recognize that documents need to be prepared and input online by someone in order for search engines to find them.
Another challenge arises from the current economic situation, which impacts INIS Member States, and, by extension, the IAEA budget. Despite acknowledging and praising the importance of information, it becomes a vulnerable target in budget cuts. Economic circumstances negatively impact the readiness of Member States to invest in collecting their national information resources and making them available to INIS. This directly impacts the level of funds available to INIS to maintain its repository.

The final challenge is unprecedented, unpredictable, quickly evolving and usually very expensive technological innovations. Digital transformation requires substantial hardware and software updates, changes in established work procedures and methodologies, and upgrades to evolving workforce skills — which necessitates substantial training and re-training.

Wherever challenges are encountered, the opportunities that come with them should also be examined. The greatest opportunity for INIS lies with the trust its members hold in this joint venture, proven throughout 50 years, millions of records, and its millions of users. Its huge collection of bibliographic and full-text records is a remarkable asset that needs to be maintained, reused, repackaged, and repurposed in multiple ways to offer new possibilities and opportunities.

INIS' popularity with its user base is also an immense asset. In 2020 alone, more than 1.7 million unique users visited INIS and performed 2.5 million searches, opened 4 million pages and downloaded almost 200,000 documents. INIS' relationship with its user base needs to be nourished by offering high quality, relevant, reliable, and trustworthy information.

The INIS Thesaurus, with over 31,000 terms, offers another opportunity to continue its transformation into modern taxonomies and ontologies. These are regarded as the main building blocks for web-based semantic applications and the use of artificial intelligence.

Conclusion

INIS celebrates its 50th anniversary recognizing its many achievements, and with high hopes and expectations. As in the previous half century, INIS is set to play a key role as a global resource of nuclear information in the coming decades.

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The Grey Side of the Green Road : Empirical Assessment of Academic Publishing in the HAL Open Repository

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Abstract
The paper provides empirical results on the part of grey literature in the French national open repository HAL. The results are based on a quantitative analysis of 973,968 deposits from 1,272 research laboratories affiliated the ten most important research universities in France (IDEX program). 35% of all deposits (documents and records) are grey literature. The main types of these items are conference papers (71%), PhD theses (11%) and preprints and working papers (8%). Their overall accessibility (degree of openness) is 37%, which is higher than commercial publications. Differences between document types, disciplines and institution are described. Further research is needed for a better understanding of how research laboratories are handling grey literature (licensing …). A follow-up study in 2021 will provide this insight.
Keywords: Open science, open access, open repositories, research laboratories, universities, grey literature

Introduction

HAL – "Hyperarticles en ligne" - is the national multidisciplinary open repository for documents and data from French scientists[1]. HAL was launched in 2001 by the Center for Direct Scientific Communication (CCSD)[2]. Funded by research organisations, the University of Lyon and the French Ministry of Higher Education, Research and Innovation, the CCSD is the host and operating agent for HAL. Actually (November 2020), HAL contains more than 2.4 million records and nearly 800,000 scientific documents in full text. The deposits are organized in institutional portals and collections from research units and projects. The following paper presents evidence on how grey literature is represented in the HAL collections of French research laboratories of ten major French research universities. Since 2016 and the vote of a "Digital Law", published results from public research can be made openly available after six months (for science, technology and medicine) or twelve months (for social sciences and humanities) (Nérisson, 2016). Some major research organisations and institutions adopted open access mandates, and a growing number of research structures and universities make use of HAL or of their own institutional repository for research assessment and monitoring.

Grey literature has been defined in various manner, especially by members and authors of the International Grey Literature Network (Farace & Schöpfel, 2010). We consider grey literature as "manifold document types produced on all levels of government, academics, business and industry in print and electronic formats that are protected by intellectual property rights, of sufficient quality to be collected and preserved by library holdings or institutional repositories, but not controlled by commercial publishers i.e., where publishing is not the primary activity of the producing body" (Schöpfel, 2011). However, usually and especially in systematic reviews, grey literature is often described as "unpublished", "not peer reviewed" and "not in databases" and meaning most of the time all kinds of reports and conference papers (Schöpfel & Prost, 2020).

[1] HAL https://hal.archives-ouvertes.fr/
[2] CCSD https://www.ccsd.cnrs.fr/en/

"Not in databases": the lack of bibliographic control, of evaluation and monitoring is the main reason why open archives and particularly institutional repositories have been seen from the beginning on as a potential solution for grey literature, in order to increase its findability, accessibility and long-term preservation. With the words of Daniela Luzi, grey literature is "at home in open archives" (Luzi, 2010).

We identified five opportunities for the further development of grey literature in institutional repositories (Schöpfel et al., 2011):

1. Universities need a solution for the processing, disseminating and archiving of electronic theses and dissertations (ETD). Institutional repositories offer an interesting solution and may at least be an element in the global academic information system for ETD.
2. Institutions want control on research output and content, and this includes unpublished documents.
3. Institutions want to improve presence and impact on the web. Grey literature in repositories adds to both, due to broader dissemination and increased use of grey items, increasing prestige and visibility for the institution.
4. The open access initiative is not limited to published documents.
5. The evolution from "collection development" to "content recruitment" in academic libraries may act in favour of deposit of grey literature in institutional repositories.

Ten years later, how is grey literature at home in open archives? Which is its part? Which kind of grey literature? The paper presents original empirical results from a follow-up study to former research on open access strategies of French laboratories (Schöpfel et al. 2018, 2019), based on the assessment of HAL deposits of more than 1,200 research laboratories from the ten most distinguished French research universities (IDEX, *excellence initiative*). These laboratories cover the whole range of scientific disciplines, including medicine, law, economics and management. The ongoing research takes account of all document and data types while the following paper limits the focus on the grey part of the academic output, in particular conference papers, reports, working papers, theses and dissertations. Empirical results are provided on the percentage of grey items in HAL, on the part of open access, differences between grey document types, disciplinary specificities and institutional strategies. Our intention is to contribute to a better understanding of the relative impact and the "degree of openness" (Schöpfel & Prost, 2014) of grey literature in open repositories.

Methodology

The study was conducted as part of a research project on open access strategies of French research laboratories. The sample consists of 1,272 research laboratories from the ten universities part of the French excellence initiative (IDEX). The laboratories were identified and described by direct search on the universities' websites, with the French national directory of research structures[1] and with the public discovery tool for French innovation and research ScanR[2] (January-March 2020).

In a second step, we recovered the laboratories' identifiers in the HAL repository, and we used them for the API search of each laboratory's deposits (July-September 2020). The results were analysed based on the laboratory and deposit metadata (domain, university, deposit type, resource category). The API search retrieved 26 different HAL resource categories; we merged and described them in the following way in order to simplify the description of the results (table 1):

HAL category	Merged category	Resource type
Journal article	Articles	White
Book (author)	Books (author)	White
Book (editor)	Books (editor)	White
Book chapter	Book chapters	White
Other	Other (white)	White
Communication	Conference papers	Grey
Poster	Posters	Grey
PhD thesis	PhD theses	Grey
Report	Reports	Grey
Activity report	Reports	Grey
Short report	Reports	Grey
Report chapter	Reports	Grey
Other report	Reports	Grey
Undefined	Preprints, working papers…	Grey
Habilitation	Other (grey)	Grey
Lecture	Other (grey)	Grey
Master dissertation	Other (grey)	Grey
BA dissertation	Other (grey)	Grey
Lecture note	Other (grey)	Grey
Presentation	Other (grey)	Grey
Patent	Other (grey)	Grey
Image	Data	Data
Map	Data	Data
Software	Data	Data
Audio	Data	Data
Video	Data	Data

Table 1. Resource categories and types

The HAL category "other" consists of book reviews, encyclopaedia entries, translations etc., most of them reviewed publications. The HAL category "undefined" consists mainly of working papers, preprints and other, non-reviewed and unpublished documents. Some of the HAL resource categories are specific to a particular, institutional workflow (i.e., ingestion of records from institutional partnerships), such as BA dissertations, lecture notes and report chapters; they represent very small figures (<100) and have been merged (reports) or included in the "other" category.

Results

The part of grey literature

The API query retrieved 973,968 deposits which represent 30% of the total HAL content. These are the items which have been authored or co-authored by scientists affiliated to one of the 1,272 research laboratories of our sample. From all these items, 35% fall under the category of grey literature (figure 1).

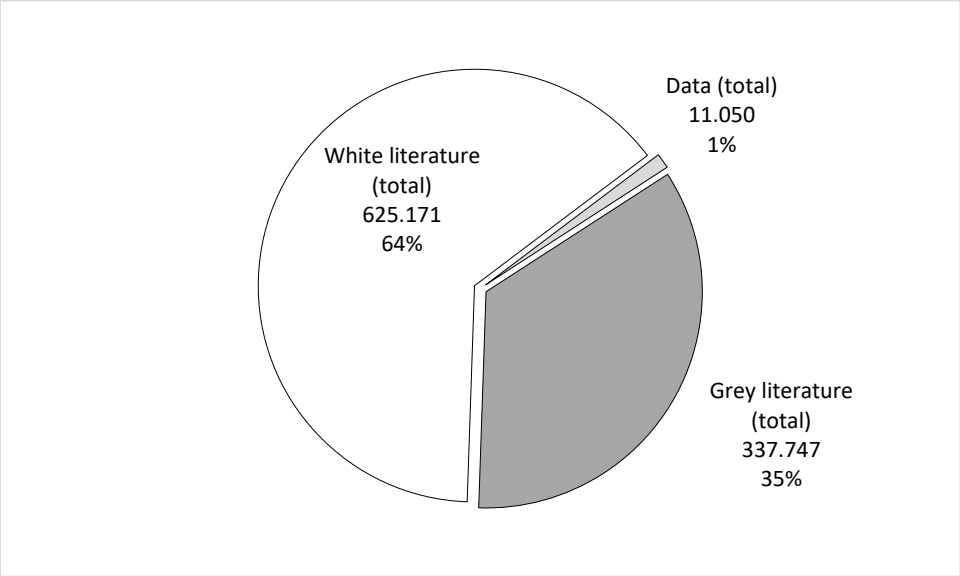

Figure 1. Part of grey literature (N=973,968 deposits)

Most of the grey literature consists of conference papers (71%), followed by PhD theses (11%) and working papers or preprints (8%). The different types of reports (project reports, activity or annual reports, short reports and report chapters) represent 4%, similar to posters (4%). Other resource types are less important, such as BA and Master dissertations, habilitation theses or lectures, totalling together 2% (figure 2).

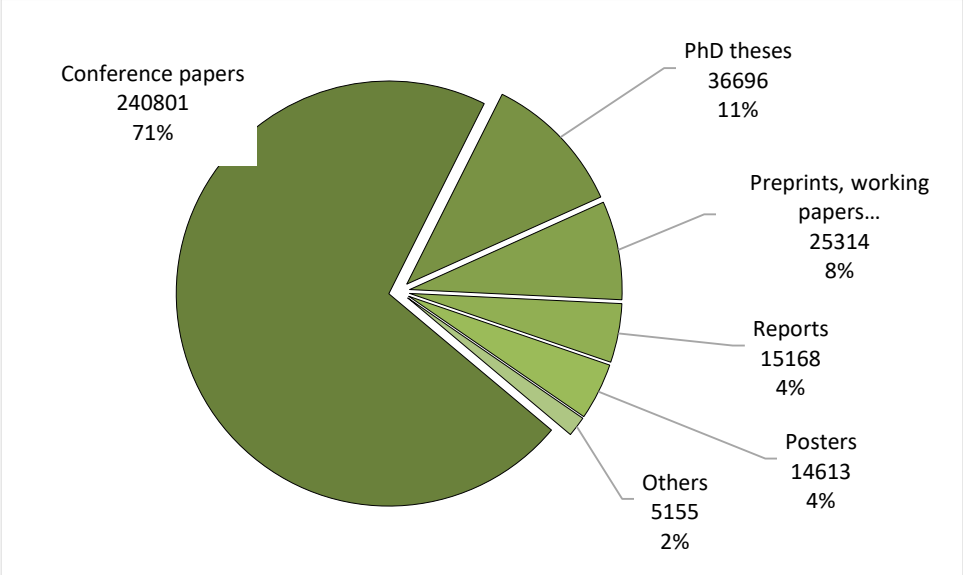

Figure 2. Types of grey literature (N=337,747 deposits)

Figure 1 shows that 1% of the deposits are neither white nor grey literature but datasets. HAL was designed as a document server, an open repository for academic publications and other scientific documents. So far, HAL has not been (re)defined as a data repository. However, since 2010, the MédiHAL portal of HAL allows to deposit visual and sound data (still images, videos and sounds), produced within the framework of scientific research. Also, there are some software deposits (codes) due to the partnership between HAL and the international Software Heritage project.

Degree of openness

The HAL repository contains deposits of full text and files as well as records, i.e. metadata without documents or files. The global part of deposits of full text is 24.3% for the whole HAL content. In our sample, this part is higher, 30.1% of the items have been

deposited together with a text or data file. This part of freely and openly available research output can be interpreted as degree of openness. If all deposits would consist of metadata and data (documents), this degree of openness would be 100%.
Figure 3 shows that the part of deposits with document files is significantly higher for grey literature (37%) than for white literature (25%).

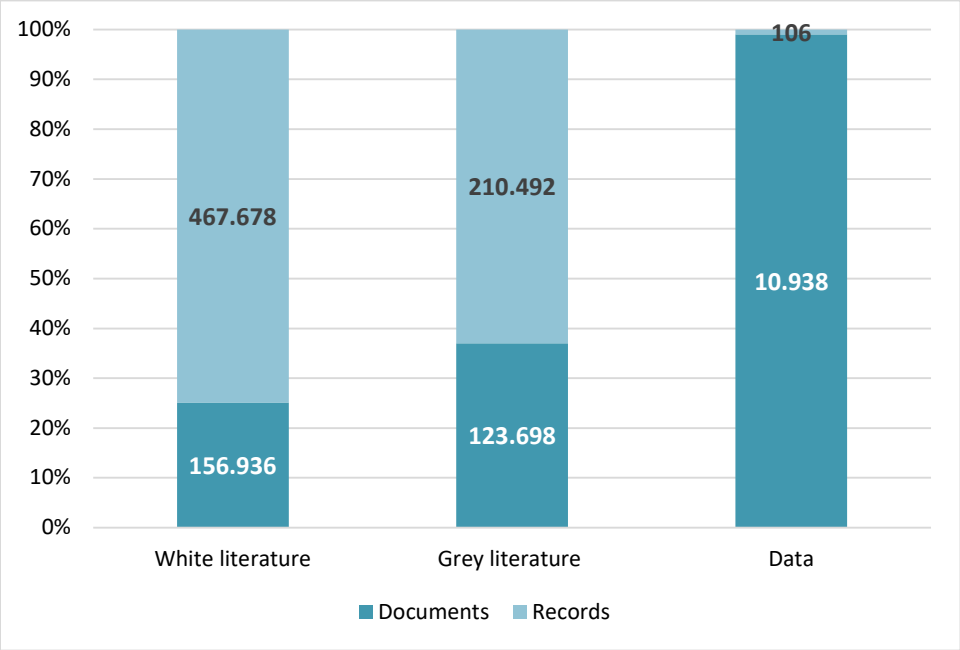

Figure 3. Deposits with and without document and data files (N=969,848 deposits)

The differences between the document types are important. Figure 4 shows the part of full text for the different types of grey literature.

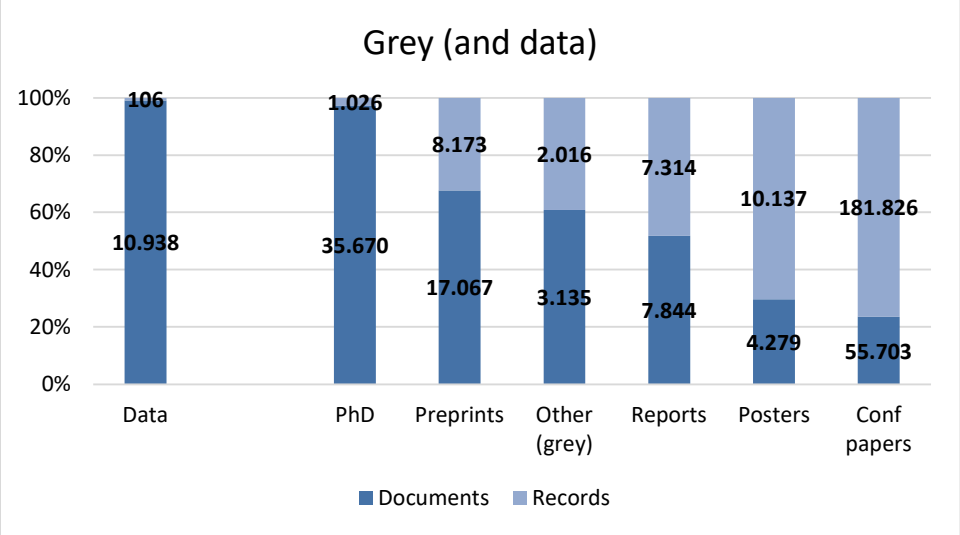

Figure 4. Grey literature deposits with and without document files (N=337,747 deposits)

The degree of openness of grey deposits is generally well above the average percentage, between 50% and near to 100%. The explanation of the exceptional part of openly available PhD theses (97%) is that the self-archiving of a PhD thesis on the HAL platform requires systematically the deposit of the text file.
The open part of the conference contributions, papers and posters, are lower, with 29% open posters and 23% open papers. This lower degree of openness is similar to the percentage of full text deposits of articles, books, chapters etc. (figure 5).

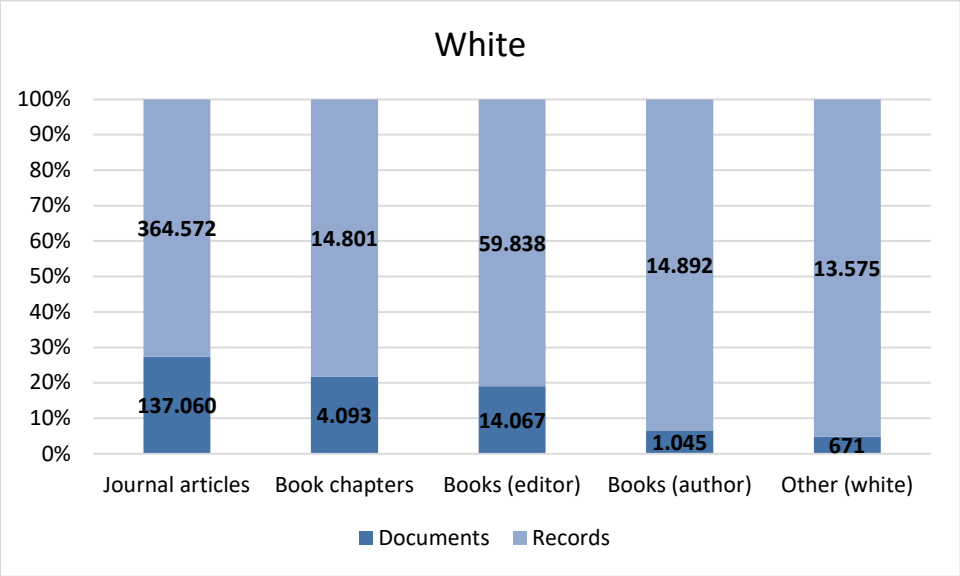

Figure 5. White literature deposits with and without document files (N=625,171 deposits)

27% of the journal articles are openly available on the HAL platform; the degree of openness of chapters, edited and authored books and other white resources is even lower.

Two other observations may be interesting. First, the part of grey literature of all deposits with full text is 44% which is significantly higher than the overall part of grey literature (37%). Second, figures 3 and 4 include the degree of openness of datasets which is exceptionally high (99%); nearly all datasets have been deposited with the data files. Again, the reason is rather simple: MédiHAL, the data portal of HAL, requires the deposit of the data files for each data deposit. Only some software records have been created without the code files.

Disciplinary differences

Each research laboratory has been indexed with a large scientific domain and with a more specific research discipline. In the following, we present the analysis of the HAL deposits regarding four large scientific domains, i.e., science and technology (SciTech), life and medical sciences (BioMed), social sciences and humanities (SSH), and law, economics and management (Law, Econ). Figure 6 shows that there are significant differences between the four domains.

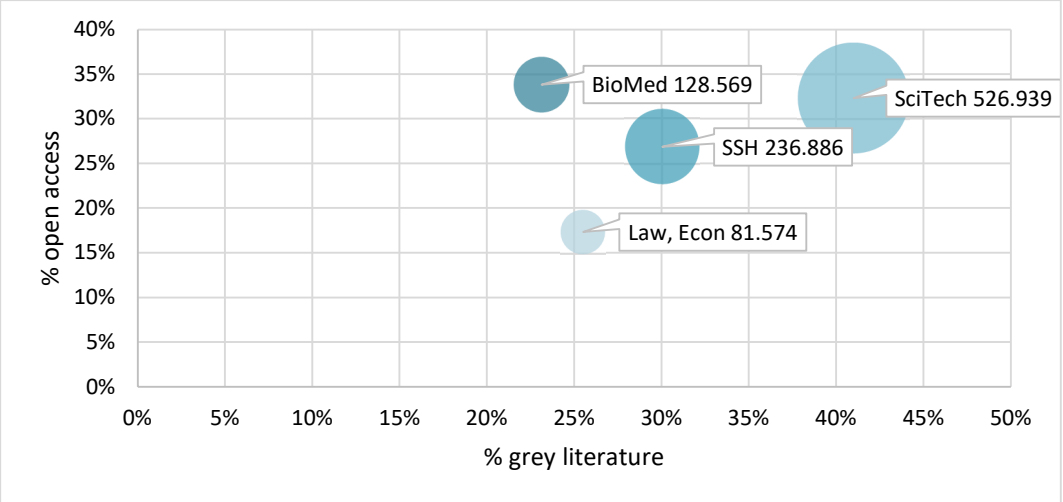

Figure 6. Degree of openness and part of grey literature in four scientific domains (N=973,968 deposits)

The deposits of the laboratories in life and medical sciences have the highest degree of openness (34%), followed by those in science and technology (32%). The same indicator is lower in social sciences and humanities (27%) and in law, economics and management (17%).
On the other hand, the laboratories in science and technology have the highest part of grey literature (41%), followed by those in social sciences and humanities (30%), law, economics and management (26%) and life and medical sciences (23%).

Institutional differences

As each laboratory is affiliated with at least (mostly) one of the ten French research universities, we finally analysed the laboratories' deposits also regarding their institutional affiliation. In other words, we determined the degree of openness and the part of grey literature for each university of our sample. Figure 7 reveals significant differences but also two clusters. Each bubble refers to a university, and the size of each bubble represents the number of deposits for this university.

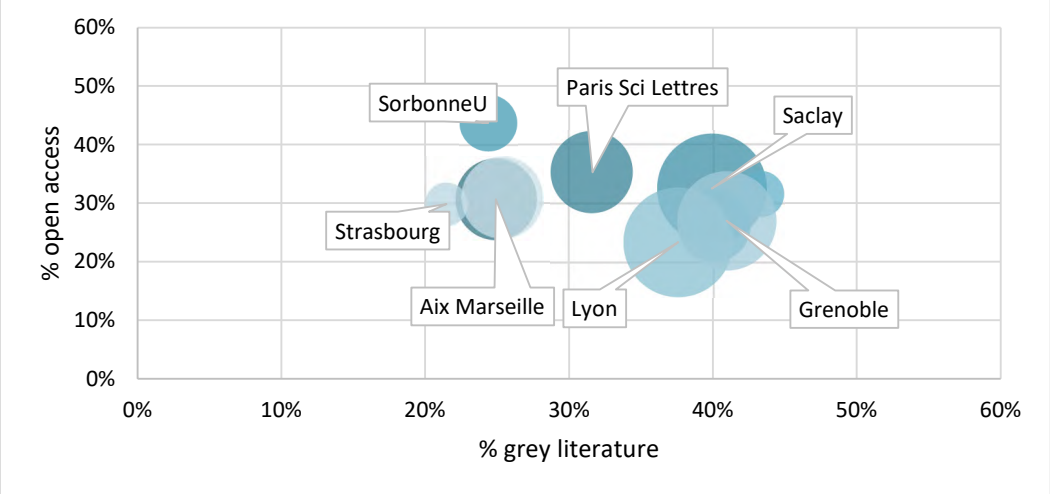

Figure 7. Degree of openness and part of grey literature per university (N=973,968 deposits)

Following figure 7, some universities appear "more open" and "greyer" than others. For instance, the degree of openness of the deposits from laboratories affiliated to Sorbonne Université (44%) and to the university of Paris Sciences Lettres (35%) than, for instance, Grenoble (27%), Bordeaux (26%) and Lyon (23%).
Regarding the part of grey literature, the universities of Nice (43%), Grenoble (41%), Bordeaux and Paris Saclay (both 40%) have deposited relatively more conference papers, PhD theses etc. than for instance Sorbonne Université (24%) or Strasbourg (21%).
Without a more detailed analysis, it is perhaps to early to speak of institutional clusters. Yet, figure 7 seems to indicate the existence of two clusters of rather similar universities (one with Strasbourg, Aix Marseille and Sorbonne Paris Cité, the other with Lyon, Grenoble, Saclay, Bordeaux and Nice) and that the main difference between these clusters is above all the different percentage of grey literature. But more research is needed for a more detailed evidence and a better understanding of these differences, which may be determined by institutional open access policies as well as by disciplinary differences.

Discussion

The impact of grey literature

Our results show that a significant part of the deposited scientific documents on HAL is grey literature - in our sample, these documents represent 35% of all deposited items, a percentage which is higher than in former surveys with French open repositories (less than 20% grey items, see Schöpfel & Stock, 2008 and Schöpfel & Prost, 2010), Spanish open repositories (23% grey items, see Melero et al., 2009) and European institutional research repositories (20% grey items, see Vernooy-Gerritsen et al., 2009). On the other hand, at the same time Luzi et al. (2009) already estimated the part of grey items eligible for the institutional repository of the Italian National Research Council at about one third of all documents. Obviously, this percentage appears to be a realistic estimation of the real impact of non-commercial and "unconventional" scientific literature, outside of and non-controlled by the academic journal and book publishing market.

Ten years ago, we observed that the number of grey documents in repositories was rapidly growing (Schöpfel & Prost, 2010). Compared to the 2010 figures, obviously not only the number but also the percentage of these grey documents increased in a significant way. This seems to confirm past appraisals that open repositories are the right place for grey literature, that it is "at home in open archives" (Luzi, 2010).

The French HAL repository provides a solution for at least three issues: it guarantees long-term conservation of deposited items through a partnership with the National Computing Center for Higher Education (CINES), it associates a unique identifier to each deposit, and it applies a generic metadata standard compliant with the Dublin Core, with some additional fields for specific document types, including theses and dissertations, conference papers and reports.

On the other side, a more detailed classification and indexing of unconventional document types is missing, which is regretful especially for potentially interesting items like working papers and preprints which can't be appropriately retrieved, but also for conference papers where a distinction between commercial publishing and grey items is more or less impossible. This is even more regretful as communications are the main part of the grey literature in our sample. A better classification would increase the findability of grey resources and contribute to the bibliodiversity, i.e., a large diversity of academic publishing.

Regarding the global part of grey literature, our results confirm domain-specific differences (which is not a surprise) but, more surprisingly, institutional differences – some large research universities have more deposits falling under the categories of grey literature than others. More analysis of our data is needed to assess whether this fact is correlated to disciplinary profiles or to the number of PhD students, or if we can identify other reasons.

The accessibility of grey literature

Our study shows that the part of accessible documents is higher for grey literature than for commercial publications. 37% of the grey literature is available in open access because deposited with the full text, while only 25% of the articles, books and book chapters are openly accessible. Furthermore, the results reveal differences between communications, theses, working papers, posters and reports which confirm former observations of different degrees of openness not only between repositories but also between document types (Schöpfel & Prost, 2015). Nearly all PhD theses and most of the preprints are in open access, while only slightly more than 20% of the conference papers are openly available on HAL.

One major reason for this difference is that HAL requires the deposit of the full text of PhD theses but not for conference papers. Another probable reason is that one part of the conference papers has been published in serials, journals or proceedings, published by commercial academic publishers. Here again, more insight is needed, for instance based on the DOI of the conference papers, to estimate the real grey, non-commercial part of conference papers.

However, there is no such explanation for the relatively low part of open access for reports and posters – except for the general observation that research units, similar to our own laboratory (see Schöpfel et al., 2018) increasingly use the HAL repository as a reservoir of metadata with the purpose of performance monitoring and assessment, through a massive deposit (creation or import) of records without the document. Open repositories are useful for research information management (see Schöpfel & Azeroual, 2021); however, if their primary function, i.e., sharing and preservation of academic production, declines or fails, their overall utility for the scientific communication may be at risk.

Another issue is the potential reusability of the openly accessible grey literature. All these documents are available in gratis open access, i.e., free of charge. Are they also in "libre" access, i.e., free for some kinds of further use and reuse (such as text mining), which presupposes some kind of open license permitting uses not permitted by default?[3] This seems unlikely because the by default condition is not licensing but intellectual property protection. Further analysis of the legal conditions of these deposits is needed to answer this question.

Our results reveal also differences between the large research domains, grey literature from science, technology and medicine being more open than in social sciences, humanities, law, economy and business. The reason may be the higher number of PhD theses but again, more research is required to determine the reasons for these differences, building on previous surveys like Fry et al. (2016).

Obviously, there are also institutional differences, some universities being more open (in terms of deposits of document files) than others. Here, further qualitative investigation will try to assess the reasons; we expect a multiple set of factors, like institutional open access policy, disciplinary differences, particular choices on the level of the individual research units and partnerships with research organizations.

Limitations

This paper provides empirical evidence from an ongoing research project. More detailed analysis is still to come, for instance regarding scientific disciplines, in order to answer questions about disciplinary particularities of HAL deposits and the correspondence between each laboratory's main field of research and the indexed disciplines of each of its deposits.

Moreover, based on the analysis of the HAL deposits, we will conduct in 2021 two surveys with the whole sample of 1,272 laboratories and with a smaller sample of some representative and particular laboratories in order to assess their strategies and practice regarding open science, open access and the HAL repository.

This second, qualitative part of the project may also fill a gap of this first study which limited the research field – open access strategies – to the deposits on HAL which is for sure the first and most important research repository in France but not the only way to publish in green open access. In particular, our first analyses exclude the self-archiving

[3] See Peter Suber, The rise of libre open access. *SPARC Open Access Newsletter*, issue #164, June 2, 2012. http://legacy.earlham.edu/~peters/fos/newsletter/06-02-12.htm#libre

via preprint servers (like arXiv, medRxiv and bioRxiv) and via academic social networks (like Academia and ResearchGate).
This exclusion of preprint servers and social networks makes it impossible to assess the real open access part of all grey literature, except for PhD theses. In France, there is no directory for reports, working papers, Master dissertations, posters or conference papers. Also, there is no centralized or federated system for the French research information management, and no consolidated figures for the research output. Whenever a laboratory makes use of the HAL repository for an (quasi-) exhaustive reporting of its academic production, similar to a research information system, the part of grey literature will be representative if not complete. Hopefully, our future surveys will reveal this approach.

Concluding remarks

The purpose of our research project HAL/LO is to identify open access strategies of French research laboratories regarding the national open repository HAL, thus putting the focus on the "green road" of open access. From a sample of 1,272 laboratories of the ten universities that are part of the French excellence initiative IDEX, we analyse the HAL deposits in order to distinguish particular approaches to HAL which could be labelled as "green open access clusters".
The large and representative number of research laboratories and their deposits provides an opportunity for an analysis of the grey literature among these items. The limitations of this methodology have been discussed above, especially the issues with indexing and the mixture of commercial and unconventional conference papers. Nevertheless, the main result appears reliable enough: about one third of all deposits is grey literature, and their accessibility (degree of openness) is higher than of commercial academic publications.
Further analysis of our sample will contribute to a deeper understanding of the "place" of grey literature in open repositories. In particular, we will conduct three complementary studies:

- The evolution of the deposit of grey literature: is the part of one third stable over the time? How does the composition of grey literature change with the years? How did the 2016 "Digital Law" and following open access mandates impact the deposit of grey literature?
- The licensing of grey literature: what are the conditions of reuse of grey literature? Is open access to grey literature more "gratis" or more "libre"?
- The existence of DOI for conference papers: which is the part of commercial publishing of conference papers?

Further, qualitative research should also contribute to a better understanding of how research laboratories consider and handle non-commercial, unconventional academic documents, especially preprints, working papers, reports and conference papers. Of particular interest will be a follow-up study in 2021, insofar the major French research organisation CNRS decided in 2020 the mandatory use of HAL for the reporting and assessment of the performance of the CNRS research laboratories and individual researchers. For this reason, the analysis of the 2020 deposits will probably provide an exhaustive and reliable photography of the academic output and of the part of the grey literature.

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Conflict of interest

The authors declare no conflict of interest.

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[1] RNSR https://appliweb.dgri.education.fr/rnsr/

[2] ScanR https://scanr.enseignementsup-recherche.gouv.fr/

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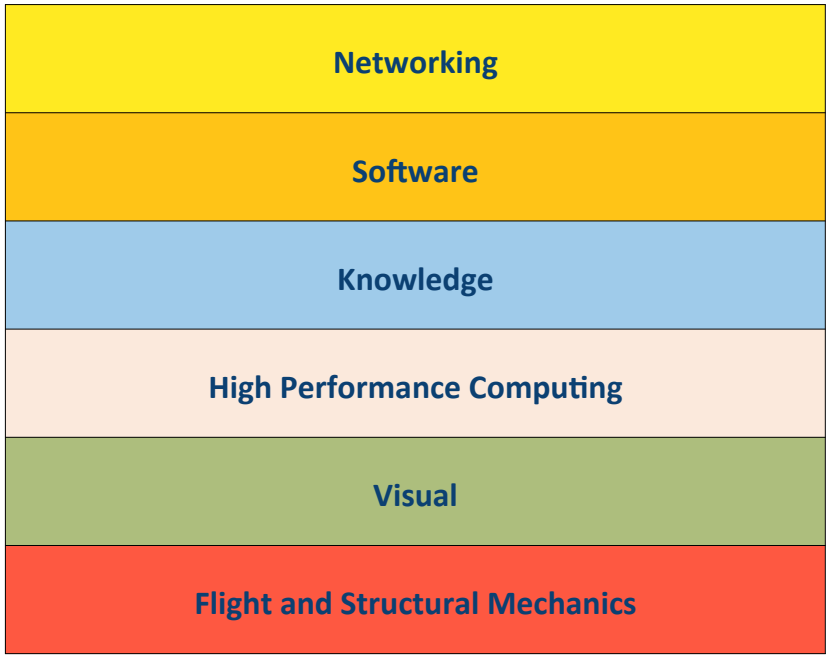

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Every document is born "grey" - Some documents can become "open"

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Abstract

As we all know, "grey" doesn't often mean "closed"; maybe sometimes it can mean just hard to find. If its sources are open and there are the conditions, the whole document could become an open access one. An example among all is the case of the pre-prints.

When you archive a pre-print in a repository you allow the free, open and "grey" pre-print become Open Access to everyone. If the immediately archived "grey" pre-print is open access it can accelerate global knowledge and research advancement.

The recent COVID-19 pandemic is making us rethink the way we communicate, search, research and inform; there are some cases of publishers which immediately publish some COVID-19 related articles pre-print; other, instead, are making soon available the accepted manuscript (post-print).

Let us concentrate on pre-prints, closer to "grey" literature.

An immediate and open pre-print could accelerate research in some fields and could let researchers (and us) know on time if there is a deadlock or not. Some publishers are following this way.

By the way, some pre-prints will never become a published article; in any case knowing those pre-prints let people know why that way is an unpassable one or if some other ways to improve research could be passable.

So, "grey" sometimes could become open to improve and accelerate research, especially in this uncommon period.

Article

In this article we deal with about preprints. Preprints are a key to let Grey Literature become Open Access in some cases that will be shown.

Being preprints related to scholarly publications, aim of the article is to show the importance of preprints by using the direct words and phrases of some scholarly publications related to preprints topics; especially in a pandemic period where the massive use of preprints accelerated Covid-19 researches and knowledge.

In the Grey Literature "grey" could mean hard to find. By the way, if its sources are open and there are the right conditions, the whole document could become an Open Access one as it could happen in some cases regarding preprints. A preprint archived in a repository allows Open Access and it can accelerate global knowledge and research advancement.

In scholarly publications there are some important differences regarding the "state" of an article:

- ***Preprint****: it is a version of a scholarly or scientific paper that precedes formal peer review and publication in a peer-reviewed scholarly or scientific journal.*
- ***Post-print (Accepted manuscript):*** *Final version of a manuscript after formal peer-review. It contains all revisions made during the peer-review process.*
- ***Version of Record*** *(VOR): the final typeset and edited* ***version*** *of the journal article that has been made available declaring the article "published".*

The recent COVID-19 pandemic is making persons rethink the way they communicate, search, research and inform. There are some cases of publishers which immediately publish some COVID-19 related articles preprints. Other, instead, are making soon available the accepted manuscripts (post-print). The case of preprints is closer to Grey Literature for the nature itself of a preprint, which usually is not a published version. The point is if unpublished documents could become Open Access if there are the conditions; in this manner they could become more and more known to the public.

The cited phrase "*if there are the conditions*" recalls the Commissioner Carlos Moedas' approach to research data: "as open as possible, as closed as necessary". It is a good point to explain the phrase "*if there are the conditions*".
An immediate and open preprint could accelerate research in some fields and could let researchers (and us) know on time if there is a deadlock or not; and some publishers are following this way opening some related preprints servers.
By the way, there are some differences among repositories, preprints repositories, and preprints servers; especially if they are related to some publishers.
It could become a philosophical matter because the unpublished preprints could be related to their peer reviewed published version if they are inside a publisher's server.
Moreover, some preprints remain in the state of preprints never becoming a published article. They may be important too. Not only for the research; they are also important because they let to know some research deadlocks to follow other possible ways of research investigations.
For these reasons, from a philosophical point of view, preprints could be related to the freedom of research; and it is important to continue to have some preprints repositories which are not directly related to some publishers.
By the way, from a philosophical point of view, making known the unknown is a process related to more and more transparency. It could be the way to let grey literature be more known: through transparency; preprints repositories could be a way.
From scholarly publications we learnt three important things:

- *The "grey" preprint becomes "white" when people let it to be Open Access in a repository.*
- *The "grey" changed in "white" preprint is useful in the research process.*
- *Some published articles are witnesses of this.*

The supporting articles

We can find these three points in some articles where we can learn some important concepts[1]:

- *«Preprints accelerate the dissemination of research and serve as vehicles for discussion—key to advancing scientific knowledge».*
- *«They provide many benefits for researchers and are rapidly becoming more widely integrated into the scholarly publishing ecosystem».*
- *«Preprints will continue to complement traditional journal publishing, adding speed, openness, and faster feedback for researchers».*

In scholarly publications preprints are related to the lack of any kind of review. The rapid spread of preprints let people think again on the review process and on the existence itself of the review in general in scholarly publications; and not only on particular cases.
To use the phrases in a related article[2]:
"Certainly, there was a time when peer review before publication was the only system that made sense. A time when scientific journals were printed and mailed, and when it was essential to do all the intellectual work in advance so that the final product on the library shelves was as accurate as possible. Today, however, all that has changed. We publish online with ease and have all the necessary tools to manage academic journals online as well. There is no longer any reason to give just two or three experts, often cloaked in anonymity, the full power to give legitimacy to an academic paper. There is no

[1] Perry K., Graf C., Pepe A., «**Preprints, Publishing, and a Pandemic: Your Questions Answered**». Link: https://www.wiley.com/network/archive/preprints-publishing-and-a-pandemic-your-questions-answered
[2] Banks M., «**A Lesson of the Pandemic: All Prints Should Be Preprints**». Link: https://www.roars.it/online/una-lezione-dalla-pandemia-i-preprint-come-nuovo-standard-delle-pubblicazioni-scientifiche/?fbclid=IwAR2h9lX46NEt9GxdSy3N1SzEEr0xuX5Apv0MIPJKE8XtSEkF4QkBhuRnBHo

more reason to seize scientific knowledge from the public for months, while it makes its way in an antiquated editorial path. The time has come to build a scientific review system for the Internet age by embracing preprints as the new standard in academic publishing".

On the other hands we know that «*with this speed come errors. Notably, there have been several high-profile retractions involving coronavirus- and COVID-19-related studies in both preprint servers and peer-reviewed journals*[3]».
Into another article some possible solutions regarding the correct use of preprints are shown and we can deduct as follow[4]:

- Only preprints are not enough.
- If you do not make data and methods public, you risk damage.
- Let's summarize: some pre-prints will never become a published article.
- In any case, knowing those pre-prints, let people know why that way is an unpassable one or if some other ways to improve research could be passable.
- So, when "grey" becomes open, it improves and accelerates research, especially in this uncommon period.

Preprints are related to the chance of Open Access when they are archived in a repository.

A related conference

During a recent conference, "*Open Access, preprints and research impact*[5]", in his talk "*Preprints and scholarly communications: Adoption, practices, drivers and barriers*" based upon his own researches, the keynote speaker Stephen Pinfield stated:

- Defining "preprints" is still controversial and not well understood in many communities.
- Preprints are seen as having major potential benefits.
- Preprints are widely seen to have significant possible drawbacks.
- There are different possible operating models of preprints servers.
- Many infrastructural components are in place but still need work.
- Different actors and communities are at different stages of innovation adoption.
- Preprints future is still unclear but possible scenarios are emerging.

Conclusions

As we already know, preprints are related to scholarly publications; for these reasons this article used the direct words and phrases of some scholarly publications related on preprints.
Preprints are not the final version of the article presented to the public and are closer to Grey Literature.
By the way, archiving in a repository is the way to let Grey Literature to become open; "*if there are the conditions*", of course.
Preprints belong to Grey Literature for definition; the act of archiving something in a repository belongs to the Open Access world if the document is archived as open to everyone.

[3] Johns Hopkins University's clinicians and researchers during the conference «**Preprints and Peer Review in a Pandemic**». Link: https://www.jhsph.edu/events/2020/preprints-peer-review-in-a-pandemic/
[4] Besançon L., Peiffer-Smadja N., Segalas C., Jiang H., Masuzzo P., Smout C., Billy E., Deforet M., Leyrat C. Link: «**Open Science Saves Lives: Lessons from the COVID-19 Pandemic**»: https://www.biorxiv.org/content/10.1101/2020.08.13.249847v2.full?fbclid=IwAR30pz6IeDK3bw4x05yG7LtAGJzJSzPeAs7dkE0pcEipJeQJO_cB-EDp8DY
[5] At the moment of this article, no slides were available for the public.

The use, as well as the spread, of preprints is still controversial and it is related to the lack of a peer review.
By the way, preprints are becoming more and more Open Access and grey literature too; that means more transparency and less "unknown" documents; in any cases thanks to preprints open repositories.

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Johns Hopkins University's clinicians and researchers during the conference «**Preprints and Peer Review in a Pandemic**». Link: https://www.jhsph.edu/events/2020/preprints-peer-review-in-a-pandemic/

Perry K., Graf C., Pepe A., «**Preprints, Publishing, and a Pandemic: Your Questions Answered**». Link: https://www.wiley.com/network/archive/preprints-publishing-and-a-pandemic-your-questions-answered

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Retrieving Grey Literature with Content Curation: A Repertoire of Institutional Resources on Covid-19

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Abstract:
Italian Government and Ministries, Health Institutes, Regions and Local Authorities have recently produced numerous documents on Covid-19: scientific bulletins, statistics, laws, protocols, regulatory measures, reports, guidelines. However, as long as it's easy to come across unofficial or false information on the web, the retrieval of reliable documents becomes strictly recommended and even essential, especially when a pandemic is underway. In this regard, librarians own the appropriate professional skills to guide users towards the retrieval of official documents and, thanks to the so-called Content Curation activity, they can select, organize and share web resources through specific digital tools and web platforms. In this background, with the aim of facilitating the retrieval of a specific type of grey literature, such as official documents on topics related to the pandemic, it was realized the "Digital Repertoire of institutional Italian web resources on Covid-19" by the "Library of the National Register of Town Clerks" using the content curation system "Wakelet".

Background

Since the beginning of the pandemic emergency, also in Italy the Government, Ministries, Institutes of Health, Public Research Bodies, Regions and Local Authorities have begun to produce and disseminate on the web numerous data, documents and information relating to Coronavirus and Covid-19. Thanks to the many official resources made available online by public institutions on such an extremely topical issue, citizens, businesses, public and private institutions can freely access different types of grey literature related to Covid-19: scientific bulletins, statistics, rules, protocols, regulations, periodic reports, guidelines.

However, given that unofficial, out-of-date or even false information is also extremely easy to find on the web, public institutions, accredited press, and scientific research institutes generally recommend the retrieval of reliable and certified documents. And if this rule is always valid in absolute terms, it is even more so today, with a pandemic in progress.

Therefore, the issue of the retrieval of official data and information on Coronavirus and Covid-19 through the web must be framed in an informative context undoubtedly critical and delicate, as also highlighted by the World Health Organization (WHO), which is currently facing a twofold fight: not only against the pandemic but also against the one that WHO itself has promptly identified and effectively defined with the term 'infodemic':

> *"An infodemic is an overabundance of information - some accurate and some not - occurring during an epidemic. It makes it hard for people to find trustworthy sources and reliable guidance when they need it. Even when people have access to high-quality information, there are still barriers they must overcome to take the recommended action. Like pathogens in epidemics, misinformation spreads further and faster and adds complexity to health emergency response*. "[1]

[1] 1st WHO Infodemiology Conference, 30 June - 16 July 2020 https://www.who.int/news-room/events/detail/2020/06/30/default-calendar/1st-who-infodemiology-conference.

In this context, the international community of librarians has also intervened to further support the call for attention to the web-based use of official documents, both at the local level with the respective national professional trade associations, and at a general level through the International Federation of Library Associations (IFLA), which has dedicated a specific section of its website to these issues: since the beginning of the pandemic, the page "Covid-19 and the Global Library Field" of the IFLA website presents the "Key Resources for Libraries in Responding to the Coronavirus Pandemic"[2]. Also thanks to resources of this kind, but above all by virtue of peculiar professional skills, librarians from all over the world continue - today even more than before - to perform effectively their traditional role as mediators of information, by properly distinguishing reliable and updated resources from those which are not and make the first available to their users.

Librarians, in fact, have consistently recognized and highlighted the importance of retrieving official data and information, long before 2016, when "post-truth" was declared word of the year by Oxford Dictionaries[3], thus formalizing the diffusion of a phenomenon which in recent years has become more and more structured and, for this reason, increasingly dangerous.

In this framework, librarians can successfully guide users towards the search and retrieval of grey literature also in the topic of Covid-19 and Coronavirus, because they are holders of the appropriate combination of professional skills and management tools needed to make a concrete contribution against the so-called *infodemic*[4] and they can stem the risks of an apparent as dangerous information disintermediation.

If, in fact, librarians guide users into the *mare magnum* of data, information and documents on the web through activities connected to services now widely consolidated and widespread, such as bibliographic reference and Information Literacy, it is undoubted that there is also another equally significant and effective activity, represented by the so-called *Content Curation*, which consists in the management of web resources on a specific topic. Web contents must be taken care of, precisely because they are in continuous exponential growth and, consequently, they need to be selected, organized and shared. As Rohit Bhargava made clear a few years ago, Content Curation's activity does not add anything new, rather it reshapes and selects the resources available on the web, helping to give them the right placement and adequate relevance for the purposes of knowledge:

> *Content Curation is a term that describes the act of finding, grouping, organizing or sharing the best and most relevant content on a specific issue. It is such a powerful idea because curation does NOT focus on adding more content / noise to the chaotic information overload of social media, and instead focuses on helping any one of us to make sense of this information by bringing together what is most important.*[5]

Beyond the topic, what matters for the librarian engaged in Content Curation activities is to be able to identify the information sources from which to retrieve data, information

[2] URL: https://www.ifla.org/covid-19-and-libraries
[3] URL: https://languages.oup.com/word-of-the-year/2016/
[4] On the subject see: Zarocostas, John. "How to fight an infodemic." The Lancet 395.10225 (2020): 676, DOI:https://doi.org/10.1016/S0140-6736(20)30461-X; Eysenbach, Gunther. "How to fight an infodemic: the four pillars of infodemic management." Journal of medical Internet research 22.6 (2020): e21820, DOI: 10.2196 / 21820.
[5] Bhargava, Rohit. "The 5 Models Of Content Curation". Influential Marketing Blog, March. 31, 2011 http://www.rohitbhargava.com/2011/03/the-5-models-of-content-curation.html.

and documents of undoubted relevance, organize these selected web resources and make them accessible through specific digital tools and web platforms.
The platforms utilized for Content Curation are generally the so-called Bookmark management tools: applications that the web offers widely, even with free access, more or less scalable, different in functionality and adaptable to individual needs[6]. One of the possible results of an effective use of a Content Curation platform is the creation and the provision of a digital online Repertoire of information sources on a specific topic or, in some cases, on a more extended disciplinary sector.

The Repertoire of Institutional Resources on Covid-19

With the aim of facilitating the retrieval of a specific type of grey literature, such as official documents on issues related to the pandemic, the *Library of the National Register of Town Clerks*[7] has made a digital Repertoire of Italian institutional web resources on Covid-19 freely available online[8]. The repertoire, realized with the platform for Content Curation "Wakelet"[9], was published starting from April 2020 and collects over fifty institutional websites.
"Covid-19 - Repertoire of institutional sources" is a selection of institutional web pages and websites that collect updated data, documents and information on regulatory measures, ordinances, circulars, guidelines, researches, statistics and other institutional documentation on containment and management of the epidemiological emergency by Covid-19. The repertoire is freely accessible online for everyone, both from the library's Wakelet homepage and from the main page of the library institutional website.
The *Library of the National Register of Town Clerks* is addressed to specific users: municipal clerks, secretaries and municipal administrators, students, scholars and doctoral candidates in public, administrative and constitutional law. The heritage of the library is mainly focused on the law of local authorities, organization and management of municipalities, human resources management, transparency and anti-corruption in public administration, institutional communication, digital public administration. When, some months ago, the repertoire of institutional sources on Covid-19 was put online, a communication was sent from the library to users, specific news was published on the homepage of the library website and institutions related to the library have been informed too, with the aim to share the repertoire as much as possible. Indeed, the Repertoire on Covid-19 is not designed to be intended only for library users: since many of them play the strategic role of administrators and municipal secretaries, the goal is also to share the resource, through them, among their colleagues and also among citizens, entrepreneurship, other local institutions and, in general, among all the community to which they belong. This can be useful also in terms of local development, transparency and accountability of the administrations.

The Tool: Wakelet

The *Library of the National Register of Town Clerks* has been using Wakelet for two years to manage and publish monthly bulletins on events, congresses, seminars, courses related to the arguments of interest to our users. Therefore, it was straightforward to choose to use Wakelet for the Covid-19 repertoire of official documents, because the features and functionality of the system have been well known. Besides, the idea of utilizing this tool for purposes different from ordinary use can be attributed to two

[6] Examples are: Scoop.it https://www.scoop.it/, Pearltrees https://www.pearltrees.com/, Raindrop.io https://raindrop.io/, Wakelet https: // wakelet .com /.
[7] URL: https://albosegretari.interno.gov.it/sections/1035/bibostazione-albo.
[8] URL: https://wakelet.com/wake/b1f7972e-832a-4bc4-accf-47fecbe9a154.
[9] URL: https://wakelet.com/

reasons. First because of the need to respond to the information requests of colleagues and library users who had difficulty in finding updated and official information sources on administrative documentation on the pandemic. Secondly, it was necessary to provide a fast system that would allow everyone to freely and easily access online data, information and institutional documentation on the topic.
Due to the experimentation of this Repertoire, in the future the management of Wakelet can be applied and certainly extended to other contexts and topics and therefore, it could be useful to satisfy even more the needs of the library users.

Conclusion

Reference tools such as the Repertoires of institutional web source are certainly included among the various types of grey literature. These Repertoires, created according to the principles of Content Curation, help to neutralize unofficial information and online fake news, stem the risks of misinformation that the web environment too often conveys and, by extension, are one of the tools that librarians have at their disposal to facilitate the acquisition of one of the fundamental prerequisites for a conscious citizenship: digital skills[10].

[10] On the importance and value of digital skills see the strategy of the European Commission implemented through the National Coalitions for Digital Skills and Jobs, URL: https://ec.europa.eu/digital-single -market / en / national-coalitions.

DIY Data Creation as Scholarly Communication

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Abstract:
Social media sites and zines function as grey literature that generate intersubjectivities between diverse disciplinary factions and layperson peer groups through discussions of shared ideas and debates concerning emergent research topics and trends. Social media sites and zines as critical data artifacts increase accessibility to much larger populations due to a lack of conventional barriers such as bibliographic databases, institutional repositories and textbooks. Zines and social media sites can also be classified as digital makerspace environments that support do it yourself (DIY) data creation as a revolutionary methodological apparatus that both increases awareness of evolving knowledge structures and expands participatory research access to lay persons.

Introduction

Scholarly communication within contemporary digital cultures often disrupt binary divisions between formal and informal modalities of distributed cognition. Infrastructural approaches to engaging with this quandary have included the evolution of social networking sites for academics (Hailu and Wu 2021 p.1). Many scholars have referred to these digital research terrains as "academic social networking sites" (Hailu and Wu 2021 p. 1); some of these began as bibliographic bookmarking sites such as Mendeley and Zotero (Hailu and Wu 2021 p. 1). Furthermore, some researchers such as Michael Wood (2020) posit that within the new digital modalities of scholarly communication, emergent scholarship could benefit if scholarly communities could "make the evaluation system more critical, multi-dimensional and responsive to the requirements of different audience groups, changing circumstances, and new ideas" (p.1). Digital environments with porous participatory architectures include zines and traditional social networking sites that include as Facebook, Twitter and Instagram. Zines and public social networking sites, with their emphases on grass roots communal interactions, diverse peer groups and audiences, and informal knowledge structures, function as grey literature. Dobrica Savic (2019) has observed that a "digital mindset requires a deep understanding that the power of technology can democratize" (p.7); contemporary scholarly communication in zines and public social networking sites have evolved into archived datasets where laypersons interact with and contribute to research discussions, disciplinary questions and become components of DIY (do it yourself) data creation.

In order to further investigate the nascent possibilities of transcending ASNs and traditional peer review protocols, my research presents zines and popular social networking sites as two digital environments that can expand one's understanding of emancipatory research that both informs a wider audience and demolishes conventional barriers to accessing scholarly outputs. Zines have the unique distinction of existing both within print (analog) and digital cultures. Zines were conceived as analog infrastructures that in turn served as epistemic objects; these objects functioned as artifacts that explicated and amplified the ideologies and beliefs of multiple communities of practice. These zine subcultures, while originally situated within arts, music, and activist contexts, soon evolved to include and reflect the values of diverse and sundry populations.

One could also posit that Zines served as early prototypes for social networking sites with the emphasis on an DIY ethos, a collapsing of conventional amateur and expert hierarchies and the use of creative cognitive tools to articulate often subversive and

postmodern principles and beliefs. Social media sites perform as both metanarratives and paratextual architectures in contemporary digital cultures. Scholarly dialogues that occur on social media sites often have collaborative and communal informalities that generate new epistemologies and ways of knowing. Zines and social media sites construct themselves as loci of scholarly communication that dismantle conventional power dynamics.

Zines

Zines are "self-published, do-it yourself (DIY) publications that come in many formats" (Du Laney et al. 2020 p.1); the term zine is a colloquial construct that evolved from the semantic synergy of the words fanzine and magazine (Du Laney et al. 2020 p. 1). Since Zines are often "small independent print publications that often fall outside of the mainstream collective memory" (Lymn 2013 p. 3) they are construed as ephemeral and additionally defy conventional indexing, classification and bibliographic infrastructures and practices. Zines are also digital artifacts though they began as analog creations; they are often (though not always) freely available to users on the internet. Visibility for zines has greatly increased due to the advent of the internet; furthermore they often reflect the values of subcultural groups such as "the feminist community, LGBTQ+ community, the punk community, fandoms etc." (The Feminist Bibliothecary). Open source materials resist familiar boundaries of paywalls, institutional constraints and sponsored publications.

Zines as open source objects are at liberty to publish content without the limitations imposed by institutions, publishing houses and corporate organizations. Zines as critical data artifacts deliberately confront conventional standards, traditional values, and popular cultural attitudes towards controversial topics. Hays (2020) observes that they "have value to scholars as articulations of identity….and as articulations of the self"(p.16). Zines as grey literature contribute to scholarly conversations about agency, power, citizen science, the custodianship of knowledge, and discussions of accessibility.

Social Networking Sites

Social media sites are digital environments that support the intraconnectedness of modern global denizens; data literacy is an increasingly crucial component in discussions of pedagogy, learning, and scholarly communication trends. Raffeghelli et al. (2020) explain that "the massive adoption of social media has crossed paths with learning management systems, creating new forms of data" (p. 2). These "new forms of data" (p.2) evolve into "data epistemologies" (Raffeghelli et al. 2020 p. 2); social media sites are environments wherein these knowledge structures are informally constructed. These informally constructed data artifacts and data epistemologies reflect the makerspace DIY ethos supported in online and analog Zine cultures and other digital environments such as wikis. Turkle and Papert discuss DIY learning patterns (1992) in the context of scientific research; their analysis of "bricolage" (p.6) or learning by doing can be applied to social media sites and informal knowledge production processes. They observe that "…bricoleurs have goals but set out to realize them in a spirit of a collaborative venture" (Turkle and Papert, 1992, p. 6); this "spirit of a collaborative venture" (p.6) is supported by social networking sites that promote and encourage diverse populations conduct interlocutions with scholars and other laypersons.

Social media networking sites are loci of progressive collaborations between scholars and their lay audiences. Discussions about data transparency in human subjects research, and cooperative and communal interactions and relationships with study participants remain pivotal elements of dialogues about ethics, power dynamics, and agency. Less formalized processes and fewer barriers between laypersons and

researchers generate circumstances wherein accessibility and diversity can be nonnegotiable ethically for future data epistemologies. Scholarly communication as a visible, flexible and adaptable construct allows for actualized social change in terms of the collapsing of binaries of expert and amateur, and the collapsing of boundaries between scholars and laypersons.

Future work

Scholars are just beginning to understand how zine cultures both analog and digital contribute to discussions of the historical records of various populations and societies; scholars generating their own data in zines and on social media sites permit laypersons to unpack the black box processes that lead to research protocols becoming knowledge structures. Those knowledge structures evolve into institutionalized caveats, systematically produced policies and sociopolitical infrastructures that have global impact. Therefore, social media sites and zines as grey literature occupy mitigating positions within scholarly dialogues regarding critical data literacies, collaborative knowledge production, and the extant values within scholarly communities of practice. Grey literature has the capacity, through social media sites and zines, to apply revolutionary methodological protocols to ontological, ideological and pedagogical approaches that directly impact what we learn, how we learn, and who determines what we learn. Privileges and power dynamics that exist within scholarly communities cannot be dismantled without diverse voices and perspectives to support new ways of knowing and alternate modalities of communication and information. Grey literature can contribute meaningfully to this purpose through bricolage; scholars-as-bricoleurs can support DIY data creation as not only scholarly communication, but critical information thinking that can change the world.

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Data Papers provide an Innovative Tool for Information and Data Management: A Use Case

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Abstract:
In earlier work dealing with Data Papers, emphasis initially focused on its definition, the construction of a standardized template in compiling its component parts, its further publication, access and data preservation[1]. this was followed by a study seeking to engage the citation and referencing of data papers and the further sharing and reuse of the data described therein[2]. a more recent work outside GreyNet's immediate community of practice[3] addressed the diverse formats used to compile and publish data papers. that study also discussed the automatic generation of data papers, and the differing opinions as to whether they contribute to data, information and/or knowledge production. drawing on the results of the above-mentioned work, this case study seeks to demonstrate how the data paper provides an innovative tool for information and data management, as part of an "ecosystem" of conference proceedings, journal articles, research data and open repositories. it relies upon GreyNet's current collection of 41 published datasets and 11 data papers[4]. this study highlights the importance of the human contribution for the writing of data papers and the enrichment of their metadata. To this end, key shared components of GreyNet's collection of data papers are discussed, namely the stakeholders, linked metadata, open data archiving, preservation, and issues of quality and information rights. The study concludes from a user perspective by addressing the value of data papers drawn from available usage statistics. The results of this study are expected to move beyond a simple case study to a use case in which the key components of data papers can be implemented in other communities of practice dealing with non-conventional 'grey' literature.

1. Introduction – Data Paper Template And Key Components

The data paper template and its component parts provide an innovative tool for data management. A completed template is not a data paper but provides for the content needed to produce a published data paper. The template is standardized and consists of five sections in which to compile and order the information and data required for a data paper. These include an overview of the bibliographic linked metadata, the methods applied, a technical description of the dataset, the potential for reuse of the data including any limitations, and key linked references. Each section is aided by a note field in order to assist the researcher/author in completing the template and further writing the data paper. Emphasis is placed on the description of the data and not on its analysis. It is understood that the analysis of data allows for multiple outputs, while the description of the data by the researcher/author is a priori defined.

Another way of examining the performance of this tool is to look at the function of its component parts as they apply to information and data management. The creators of the data are assigned an ORCiD, a unique persistent identifier, establishing their professional identity, it shows that the data is housed in a trusted data archive carrying the CoreTrustSeal and that not only is the data published in an archive, but its accompanying data paper is published as a journal article, thus driving further awareness to the research data. The DOI, digital object identifier, guarantees the findability of the data even if it changes archives. The CC0 waived rights of the data

allow for its open access, and together these components of the data paper are shown to adhere to the FAIR data principles (Findability, Accessibility, Interoperability, and Reuse) – an indication of the quality of the data.

2. Data Paper In Line With Other Grey Literature Document Types

Research data and its accompanying data paper stand not alone but in line with other related document types, which together form GreyNet's document trail. In 2012, GreyNet's first datasets within its Enhanced Publications Project were published in the DANS Easy Archive. The following year, it became part of GreyNet's information and data workflow. It was not until 2017 within GreyNet's Data Papers Project, that its first data paper was published. In that following year, the benefits of this tool for information and data management soon became evident and measurable. Not only was GreyNet's document trail extended with a further document type in both preprint and article format, but it opened (cross) links to other related documents, it allowed for further statistics on document use and downloads. One example is from the quarterly statistics provided by EBSCO on the number of downloads of GreyNet data papers published in The Grey Journal. These totalled 290 downloads over the period 2018-2019. It is also thought to increase the potential for data citation, referencing, and the reuse of datasets. However, it remains a fact that GreyNet's collection of published datasets linked to a data paper is relatively small. This is seen when compared with other of GreyNet's collections, such as slide presentations and conference papers. However, because the data paper prompted further development of its workflow as well as its capacity to manage information and data across collections, it rightly can be considered an innovative tool.

3. Data Papers Enrich Greynet's Published Datasets

In 2012, GreyNet entered together with DANS Easy Archive in an Enhanced Publications Project to begin housing its datasets linked to its collection of Conference Papers. Since then, the number of GreyNet's datasets entered in the DANS Archive averages circa 5 per year. In 2015, GreyNet undertook a project on leveraging its sustained information resources. The results of a stakeholder survey indicated that the use and awareness of its collection of its datasets were significantly lower than those of its other sustained information resources.

In 2017, GreyNet together with one of its associate members - the University of Florida; George A. Smathers Libraries – initiated a Data Papers Project, which undertook the construction of a standardized template in compiling its component parts, its further publication, open access and preservation. As part of this project, three workshops on data papers have since been organized and carried out together with three of its associate members in the United States, Italy, and the Czech Republic.

The results of the Data Papers Project on the use of GreyNet's published datasets can be summarized as follows: Between mid-October 2012 and early April 2020, GreyNet's collection of published datasets number 41 housed in the DANS Easy Archive. During this period, the 41 datasets were downloaded a total of 771 times, averaging 18.8 downloads per dataset. Of those 41 datasets, 11 have an accompanying Data Paper, which accounts for 331 (42.9%) of the 771 downloaded datasets. On average, they account for 30.1 downloads per dataset.

As of April 4, 2020 **GreyNet's Collection of Published Datasets in DANS Easy Archive**	**With Data Papers**	**Without Data Papers**
41 Datasets	11 (26.8%)	30 (73.2%)
771 Downloads	331 (42.9%)	440 (57.1%)
Average Downloads per Dataset	**30.1**	**18.8**

Table 1: Comparison of dataset downloads with and without an accompanying data paper

The table above indicates that on average GreyNet's datasets with an accompanying Data Paper show an increase of 11.3 (37.5%) downloads per dataset compared with those that do not include a Data Paper

4. Data Papers for Other Communities of Practice

Given the background, developments, and the results to date in GreyNet's Data Papers Project, the question now raised is whether data papers can serve other communities of practice within the field of grey literature. Here, we briefly discuss GreyNet's recent initiative to expand its project.

In February 2020, researchers/authors outside of GreyNet's community of practice were invited to submit their research data and write a Data Paper using the standardized template described above. The selection was made based on recent conference papers dealing with grey literature that contain statistical data. Now two and half months on, there have been 4 responses to the request – the phases of each to date are recorded in the table below.

Response Number:	Dataset(s) Submitted to GreyNet	Data Paper Drafted	Dataset(s) published in DANS	Data Paper Uploaded in DANS	Data Paper Preprint in RGL-GreyGuide	Data Paper Published in TGJ Vol.16
R1.	☑	☑	☑	☑	☑	☑
R2.	☑	☑	☑	☑	☑	☑
R3.	☑	☐	☐	☐	☐	☐
R4.	☑	☑	☐	☐	☐	☐

Table 2: Workflow from submission of the dataset to publication of the data paper as a journal article

In brief, two of the four researchers/authors (R1 and R2) responded to the request by submitting their datasets and accompanying data papers. These two data papers await formal publication in The Grey Journal[5], Volume 16, Number 2, Summer 2020. Another researcher/author (R3) submitted the dataset, however the data paper has yet to commence. And, (R4) entered later in the project, however has since submitted both the data and draft data paper.[6]

5. Concluding Remarks

While it may be premature to speculate on the implementation of Data Papers in the workflow of other grey literature communities, the benefits of this tool for GreyNet's management of data and information are clear. To a certain extent, GreyNet is prepared to enable the publication of datasets outside of its immediate catchment and further publish their related data papers. Nonetheless, its continuing role remains in education and training on Data Papers as a tool for information and data management.

References

[1] FARACE D., FRANTZEN J., and SMITH II P. L, (2018). Data Papers are Witness to Trusted Resources in Grey and Access to Grey Literature, Rome, Italy 23-24 October 2017 https://doi.org/10.26069/greynet-2018-000.002-gg

[2] FARACE D., FRANTZEN J., and SCHÖPFEL J, (2019). Open Data engages Citation and Reuse: A Follow-up Study on Enhanced Publication. In: Twentieth International Conference on Grey Literature, Loyola University New Orleans, USA December 3-4 2018 vol. 20 pp. 117-122. https://doi.org/10.26069/greynet-2019-000.070-gg

[3] SCHÖPFEL, J., FARACE, D., PROST, H., and ZANE, A. (2019). Data Papers as a New Form of Knowledge Organization in the Field of Research Data. Knowledge Organization, 46(8), 622–638. https://doi.org/10.5771/0943-7444-2019-8-622

[4] GREYNET – GREY LITERATURE NETWORK SERVICE; Amsterdam - The Netherlands; (2012): Thematic collection: GreyNet Enhanced Publications Project. https://doi.org/10.17026/dans-zp3-pd7e

[5] FARACE D. (ed.) 2020. The Grey Journal: An International Journal on Grey Literature / GreyNet, Grey Literature Network Service. - Amsterdam: TextRelease, Vol. 16, 2020. – e-ISSN 1574-180X (PDF) http://www.greynet.org/thegreyjournal.html

[6] **Note:** Since the completion of the text writing to submission of this conference paper for GL2020, all four data papers mentioned in Table 2 have since appeared published in The Grey Journal.

Czech National Repository of Grey Literature

NUSL is

a digital repository for grey literature

Free

online access

Features

Provider:
National Library of Technology
Prague, Czech Republic

Records:
over 500,000 records

Collection provenance:
Czech Republic

Partners:
over 150 organizations (Academy of Science, Public Research Institutions, Universities, State Offices, Libraries, NGOs etc.)

International Cooperation:
OpenGrey, OpenAire, ROAR, OpenDOAR, BASE, WorldWideScience

Goals

- Central access to grey literature and the results of research and development in the Czech Republic
- Support of science, research and education
- Systematic collection of metadata and digital documents
- Long-term archiving and preservation
- Cooperation with foreign repositories

What else?

Conference on Grey Literature and Repositories
https://nusl.techlib.cz/en/conference

Informative Webpages
https://nusl.techlib.cz/en/

www.nusl.cz

NTK 90° 105° 25°
Národní technická knihovna
National Library of Technology

NUSL czech national repository of grey literature

Czech Grey Literature and Research Outputs: Transformation of the NUŠL Service

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Abstract
The Czech National Repository of Grey Literature (NUSL) has been bringing GL to science and society over 10 years. It is based on Lisbon definition from 1997, updated in 2004, and on its own document typology that was created in 2008 as one of the outputs of the same name project. Since then there have been several papers and articles calling for new definition and new typology, asking what should be still considered GL and what not anymore. (Savić, 2018; Baxter and Hilbrecht, 2020) Savic (2019) pointed out that if everything can be marked as GL then probably nothing is GL.
The NUSL already had to change its typology few times to provide still good service and to reflect research institutions' needs. However, it is not only the document typology that influences the repository and the service, there are other circumstances which affect further development of the NUSL such as partner institutions' needs, the National Research, Development and Innovation Policy, European Commission's guidelines on research outputs, current quantity and quality of other repositories and systems for grey literature and research results in the Czech Republic etc.
The contribution/paper will bring a brief overview on NUSL's experience over 10 years of providing the service. Then it will be focused on a current situation in research area of the Czech Republic in detail. Finally, out of these points will conclude to the necessary changes that has to be taken by NUSL and his provider – National Library of Technology in Prague, in order to keep the service meaningful.
Keywords: The Czech National Repository of Grey Literature; Grey literature; Research and development; Research outputs; Digital repository

Introduction

The Czech National Repository of Grey Literature (NUŠL) has been bringing grey literature to science and society for over 10 years. During this period, the fourth industrial revolution started, based on the initial concept presented in Hannover Fair in 2011. Its main principle is "smart factory" or "smart manufacture" based on cyber-physical systems, internet of things, artificial intelligence etc.. Industry 4.0 will affect every activity and every industry in some way, including grey literature (GL). "In the last few decades, developments in information technology have had an immense impact on the way we manage information in general, and on the way we create, disseminate and use GL" (Savić 2018).

Even NUŠL must react to this and to the changing Czech societal and R&D environment. NUŠL already has had to proceed with several reforms in the past to continue providing good service and to reflect the needs of research institutions, often related to its document typology, but now it faces a major change that will affect the entire service.

This paper summarizes experiences with NUŠL, GL, and its collecting processes. These experiences, together with external influences, provide the background for NUŠL's transformation and a new GL approach.

NUŠL Service and Lessons Learned

With the NUŠL service, the National Library of Technology in Prague (NTK) followed a long tradition of collecting GL. Within the project,[1] a document typology[2], metadata standard[3], cataloging rules, data import and export possibilities, and a submission workflow were established. The repository was built using Invenio, version 1, open-source software (https://invenio.nusl.cz). A central search interface (https://nusl.cz) was created above the repository using FAST software (Pejšová 2009), nowadays on open-source Elasticsearch.

In 2012, the repository switched to regular operation as a service. By the end of 2020, it managed to extend its content up to 600,000 records on documents in various languages that have Czech provenance. Czech institutions (e.g., universities, public and private research institutions, museums, and others) that provide content on the basis of a signed cooperation agreement have two options to participate: either automatically through their systems (usually via OAI-PMH) or by manual submission directly into NUŠL made by their authorized submitters**.** Using the service is free of charge and voluntary. The only exception is the Regulation of the Minister of Culture on Certified Methodologies funded by the Ministry of Culture of the Czech Republic; full-texts of these methodologies are mandatorily submitted into NUŠL (Czech Republic. Ministry of Culture 2018).

Technical aspects of NUŠL's operations

During its entire operation, NUŠL's workflow has been continuously adjusted and new functionality has been added, such as possibilities for sharing records, exports into citation managers, and links to project records in the Czech R&D Information System[4] (hereafter, R&D System) via project number (Charvátová, Pejšová 2015). However, we have recently run into more barriers and limits to fulfilling the mission of the repository, conceptually as well as technically, and including limiting content acquisition options. Automated harvesting from other storages means the less effort for providers, but correction of potential errors in NUŠL is more complicated. Whereas, direct manual submissions are time demanding. Submitters have to deal with challenging assignments: select GL from other outputs, collect GL from colleagues, and then create records in NUŠL and attach full texts. Furthermore, submitters often have to insert the same documents into multiple systems, mostly the R&D System where submissions are mandatory each year due to legislative requirements,[5] then into library catalogs (ILS) or institutional publishing activities reports. This double workload is exhausting and needless. We would like to focus on this issue in the future and reduce the manual workload. Because of this, future interoperability with the R&D System is essential.

Since 2018, we had to start addressing problems with the repository software because Invenio v1's sustainability ended (CERN 2020) followed by, in 2020, support for Python 2.7 (Peterson 2014), the programming language in which Invenio v1 was written.

Invenio is an open-source software and its support and development depend primarily on CERN, the European Organization for Nuclear Research. 63 installations[6] of different

[1] Digitální knihovna pro šedou literaturu – funkční model a pilotní realizace, 2008 – 2011 [Digital Library for Grey Literature – functional model and pilot release], project no. DC08P02OUK007

[2] First NUŠL document typology (https://invenio.nusl.cz/record/111521/files/idr-266_3.pdf)

[3] NUŠL Metadata Format, version 1 (http://www.nusl.cz/ntk/nusl-111514)

[4] The Czech R&D Information System (https://www.rvvi.cz/)

[5] Zákon č. 130/2002 Sb. Zákon o podpoře výzkumu a vývoje z veřejných prostředků a o změně některých souvisejících zákonů (zákon o podpoře výzkumu a vývoje), available from: https://www.zakonyprolidi.cz/cs/2002-130

[6] of which 28 is registered OpenDOAR

versions are known worldwide (CERN 2019a), of which four are in the Czech Republic[7] plus one private library (Tilsch Library[8]). This leads to human resources issues in the Czech Republic because few developers are familiar with Invenio.

In 2018, CERN released Invenio v3 (CERN 2020), no longer a classical ready-to-install repository but a framework that provides the background for building one's own final software solution. Its advantages include immense flexibility and the possibility of building any solution. Its disadvantage is increasing demands on human resources, especially developers. The "Invenio Framework" is intended primarily for large-scale repositories, which means it can handle an enormous amount of data: over 100 million records and petabytes of files (CERN 2019b); this is the main advantage of the new version. Also advantageous is a change of internal format from MARCXML to web-native JSON, which brings flexibility in metadata description but increased labor requirements. Therefore, these circumstances might lead some institutions and people operating small installations of Invenio v1 or v2 to a consideration of migrating to other software solutions.

Migrating to Invenio v3 means many challenges for NTK, but most importantly, new opportunities for enhancing the repository and its functionalities. For example, Elasticsearch, used for the current central search interface (nusl.cz), is incorporated within Invenio v3. This we recognize as a substantial improvement because there will no longer be the need of the separate central search interface. Confusion about different URLs should disappear and user experience should be substantially improved.

GL influence on the NUŠL service

NUŠL only focuses on grey literature, which has its pros and cons, and means NUŠL has a clear range of documents that can be accepted. These documents are not usually registered anywhere, and NUŠL profits from this. Generally, there are not many concerns about making GL freely available, because GL is not burdened with relations between authors and publishers. Mostly, it is about gaining the consent of co-authors or defining the institutional policies regarding employee works. Nevertheless, due to the separation of GL from other outputs or publication activities, and since white literature is given preference over GL because of science evaluation principles, GL rarely attracts attention.

The term "GL" often causes troubles of its own. It is still not well known among Czech librarians and information professionals, not to mention other researchers or the public. Moreover, not even information professionals cannot agree on what document types should be still considered "grey", under what conditions. GreyNet International[9] provides an international GL document typology, but other types still appear or are under discussion. For example, Simadlová (2012), and Gelfand and Lin (2012) describe the various content of social networks and media as being GL. Ferry et al. (2008) also found a parallel between Second Life and GL. Not only text materials can be considered GL. Video recordings (e.g., recordings from events or other scientific videos) (Drees, Plank 2018) or research data (Giannini, Deluca, Molino, Biagioni 2018) can also be considered GL. Savić (2019) pointed out that if everything can be marked as GL, then probably nothing is GL.

[7] Institutional Digital Repository NTK (National Library of Technology) http://repozitar.techlib.cz;
National Repository of Grey Literature (National Library of Technology) https://invenio.nusl.cz;
The Institute of Theoretical and Applied Mechanics (https://invenio.itam.cas.cz);
Surveying Library of VUGTK (Research Institute of Geodesy, Topography, and Cartography) https://knihovna.vugtk.cz/

[8] Tilsch Library available from https://violet.katabrozova.cz/collection/Emanuel%20Tilsch?ln=cs

[9] Document Types in Grey Literature (http://www.greynet.org/greysourceindex/documenttypes.html)

Defining the exact target user group for GL is also difficult, since a broad spectrum of documents can be marked as GL. Target groups of each type of GL can be diverse: students typically focus primarily on electronic theses and dissertations (ETDs) and often do not notice other types of GL, whereas researchers may be more interested in conference proceedings and research reports. Current Google Analytics settings for NUŠL partially help to determinate the most searched document types, but the question of actually *who its users are* remains open. Statistics data only show the way users enter the NUŠL sites (direct, organic or referral) and how much time they spend in the repository. The most consequential unknown is if users do not stay long on the NUŠL platform because they have found what they were looking for or if this is the other way around and Google Analytics does not suffice for answering this question.

Evolution of the NUŠL typology

Over time, NUŠL's focus on GL, together with its applied typology, have themselves become hurdles to use of the repository by more partner institutions. The original NUŠL typology resulted from research into several typologies in 2008 (State Technical Library 2009a). The typology has been adjusted several times based on experiences since then (i.e., growth of each document type and dealing with partner institutions contacts regarding their document production). Figure 1 contains its current form. A vital part performed the willingness and possibilities of institutions to make documents publicly available in NUŠL (Černohlávková, Vyčítalová 2018).

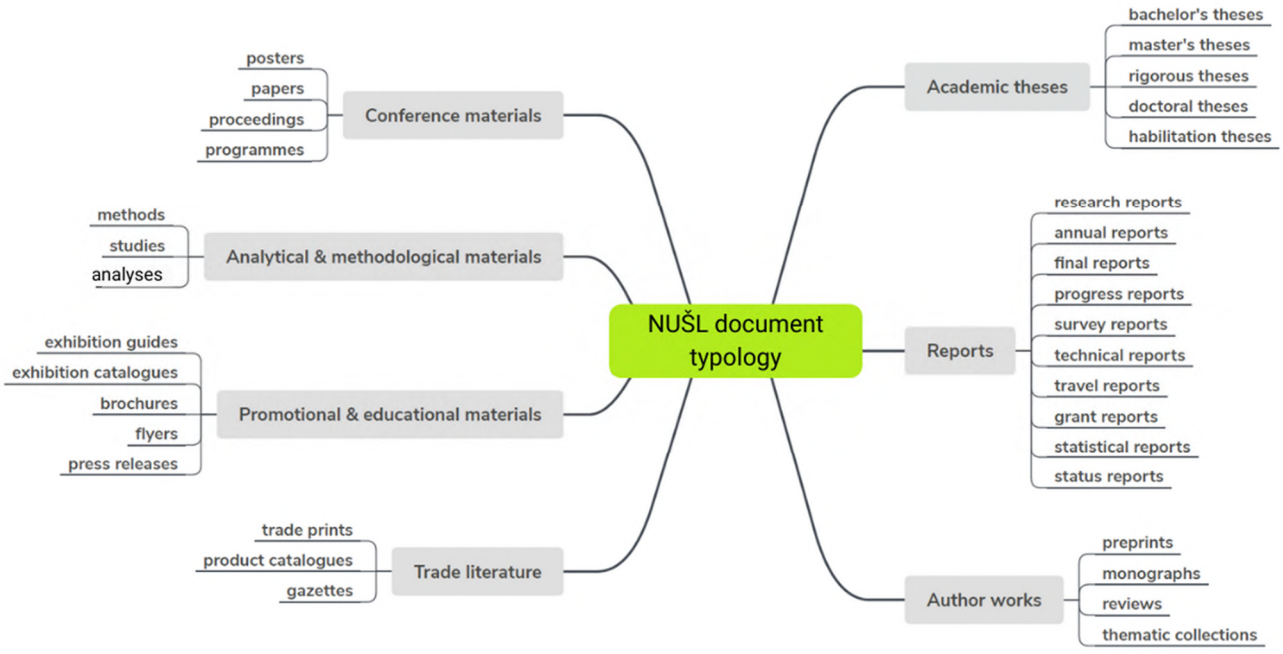


Figure 1: Current NUŠL document typology

Nevertheless, even this adjusted typology is still limiting for participating institutions, particularly those without their own repository. Submitters have to carefully sort unpublished documents from published ones in order to store them in NUŠL. Then, if they would like to store published documents they will have to look for other possibilities Overall, the question of how to face such challenges and where to direct the focus of the repository became more pressing over time.

External circumstances impacting NUŠL's operations

Over time, NUŠL the operation and further development are influenced by external circumstances such as the legislative, economic, and current situation as well as the needs of GL providers. First, except for one exception, participation is not supported legislatively. Therefore, growth of NUŠL content depends only on the institutions, their leaders, and the submitters themselves. Certain Czech Copyright Act limits apply and dealing with the property copyright in practice.

Technical obstacles on the side of providers include low levels (or non-existence of) system interoperability in the Czech Republic. During NUŠL's initial development, it was assumed that the interoperability would increase and that all publishing activities and other outputs, including GL and full texts, would be stored in them. Unfortunately, this did not happen. Czech institutional repositories are usually university systems for ETD archiving purposes, largely due to mandatory requirements included in the national Higher Education Act. Smaller institutions often lack the budget and human resources to develop and maintain their own repositories or to subscribe to fee-based services.

On the other hand, the pressure for open access to research outputs that have been publicly funded has increased, supported by conceptual documents and strategies (e.g., Plan S, Horizon 2020, followed by Horizon Europe in 2021+, the Czech Action Plan for Implementation of the National Strategy for OA to Scientific Information for 2017-2020, followed by the Czech National Research Development and Innovation Policy 2021+). Therefore, some institutions plan on or already have started with extending their repository typologies. For example, Czech Technical University in Prague[10] has started to collect articles and certified methodologies; Tomas Bata University in Zlín,[11] articles, conference proceedings, books and book chapters; Brno University of Technology,[12] conference proceedings and journals; and the University of West Bohemia[13] books, conference papers, working papers and reports, and so on.

The National R&D System only collects bibliographical records with URLs to the output's storage locations, where applicable. Recently is has been extended to provide information about the accessibility of an output in compliance with the COAR vocabulary (Council for Research, Development and Innovation of the Czech Republic 2021). So far, NUŠL was very limited in assistance to its partners with the fulfillment of availability obligations of R&D outputs due to its focus on GL. The only intersections of NUŠL's typology and the R&D System's "definition of research and development document types"[14] (typology) at present only include research report, conference paper, and certified methodology.

Transformation of the NUŠL service

The abovementioned experiences, circumstances, and software upgrade requirements strongly indicate that an upgrade and improvement of NUŠL in its current form do not suffice. It has been necessary to reevaluate the entire NUŠL concept, including its goals, service offer, as well as a further presentation of GL. A primary question in discussions about the future included whether the GL specialization would be sufficient for NUŠL stakeholders and needs of the Czech R&D community, or if a broader scope would better meet these demands.

[10] Digital Library of the Czech Technical University in Prague (https://dspace.cvut.cz)
[11] DSpace at Tomas Bata University Zlín (http://publikace.k.utb.cz/)
[12] Digital library of Brno University of Technology (https://dspace.vutbr.cz/)
[13] Digital Library University of West Bohemia (Digital Library of UWB) (https://dspace5.zcu.cz)
[14] Available from https://www.vyzkum.cz/FrontClanek.aspx?idsekce=29415

NTK would like to support the growth of open access to any documents, i.e., enable institutions to store all their outputs of publishing activities and other research outputs, including GL. The Ministry of Education, Youth and Sports, which funds NTK, supports this idea and has incorporated it into a new grant project entitled "National Centre for Information Support of Research, Development, and Innovation (2021 - 2027)." Under the auspices of this project, NUŠL will be transformed into the Czech National Repository and it will accept both published and unpublished research documents of a textual nature. Another significant change will be the ability to scale up document accessibility in compliance with the COAR AccessRights Vocabulary.[15]

NTK, the University of Chemistry and Technology Prague, and CESNET[16] will collaborate on the technical upgrade. CESNET will also provide its infrastructure. The Council for Research, Development and Innovation of the Czech Republic is willing to cooperate to ensure interoperability with the R&D System maintained by the Council, and thus duplication of stakeholder effort will be avoided. The renewal of interoperability with international systems, which NUŠL achieved,[17] is intended.

Transformation: first steps

The government approved funding for the new project in October 2020. The project kicks off in 2021. In preparing for the project, we have already identified the needs of our stakeholders and subsequently, defined a new document typology.

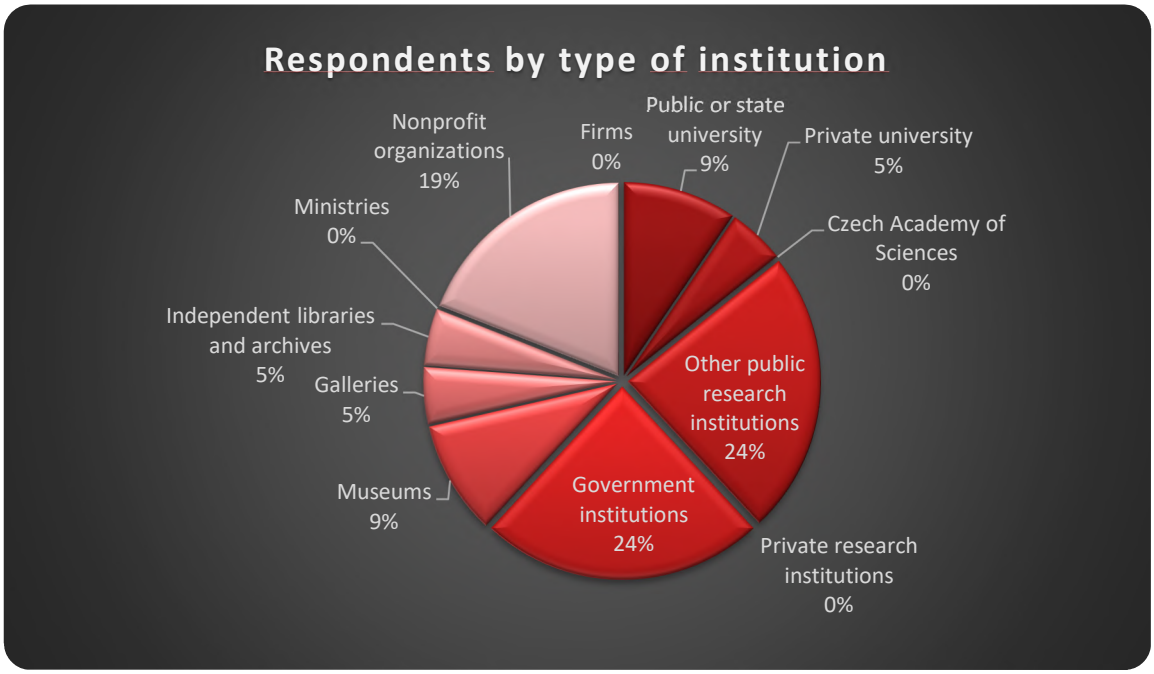
Survey among stakeholders

The purpose of the survey was to collect feedback from our main stakeholders regarding typology, accessibility, file formats, and participation limits in the form of a questionnaire sent to all NUŠL submitters (87) and 9 administrators of harvested systems (96 in total). Email delivery failed in three cases. 21 respondents completed the survey; the questionnaire return rate was 22.6%. Of this total, only 2 respondents were administrators; 2 others responded by email. The representation of types of institutions participating in the survey roughly corresponded to the amount of partner institutions in NUŠL categories (see Graph 1).

[15] Controlled Vocabulary for Access Rights (Version 1.0) (http://vocabularies.coar-repositories.org/documentation/access_rights/)

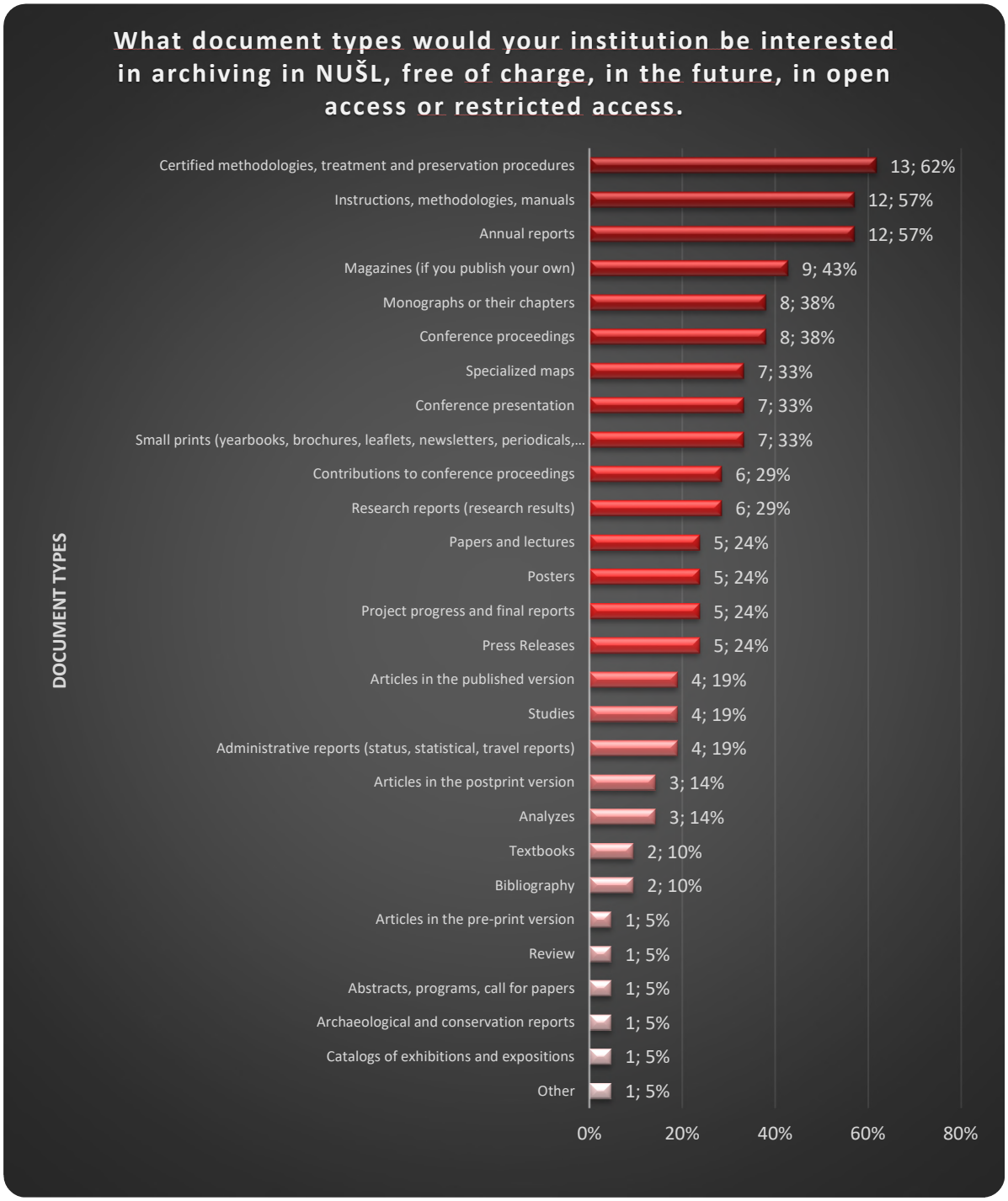
[16] CESNET is an association of universities of the Czech Republic and the Czech Academy of Sciences. It operates and develops the national e-infrastructure for science, research and education which encompasses a computer network, computational grids, data storage and collaborative environment. (https://www.cesnet.cz/?lang=en)

[17] NUŠL cooperation with international portals and registries (https://nusl.techlib.cz/en/nrgl/nrgl-and-international-cooperation)



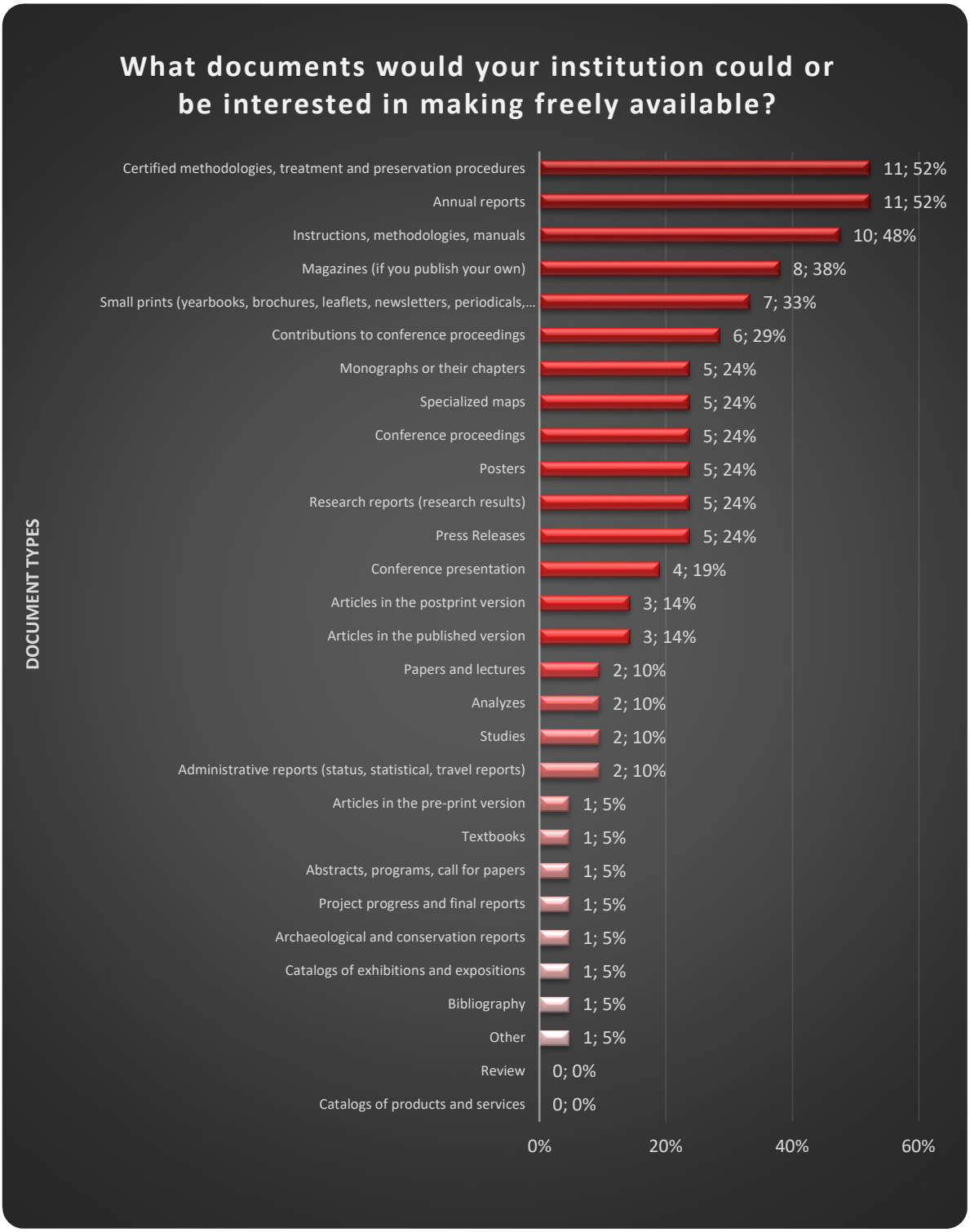
Graph 1: Types of institutions who participated in the NUŠL survey

The survey examined which documents participants would be interested in storing in the repository in the future, either openly or with some restrictions, in order to create a new typology (see Graph 2). Multiple response options were possible. Most often, respondents stated they would be willing to provide methodologies and procedures (certified or not) and annual reports. The fourth most common document type for submission to the repository mentioned by respondents was "journals published by the institution." However, it is not clear whether respondents meant by this real publishing activity in peer-reviewed or impact journals or if they were focused on GL and meant other materials such as bulletins, newsletters, and working papers. It is also possible that other people or departments (not the NUŠL contacts who comprised the respondent cohort) are in charge of scholarly publishing outputs of their institution. The respondents completed the survey on behalf of their institution but it is not clear, if they checked their answers with leaders and other departments or if they only expressed their assumptions. Therefore, the survey likely did not provide accurate feedback in this regard. The questionnaire was non-binding; the decision to store new kinds of documents in the repository would have to be made by institutional leaders.



Graph 2: Overview of documents that survey respondents would like to store in the repository

When asked about their willingness to put documents in open access (OA) mode into the repository (see Graph 3; multiple choices were possible), the order of documents mentioned changed slightly. This was most noticeable for monographs, which dropped by 3 places in comparison to Graph 2. Willingness to store OA small prints was noticeably apparent. "Journals" remained at the same level in Graph 2 as in Graph 3, which only confirms the assumption that respondents imagined newsletters rather than peer-reviewed periodicals. Overall, the number of selected document types in OA was lower than in Graph 2 (149 vs. 109), implying that institutions would welcome the possibility of closed or restricted access. However, regarding a possible time embargo, only 29% of respondents stated they would use it, mostly for journals, monographs, textbooks, studies, conference papers, and research reports.

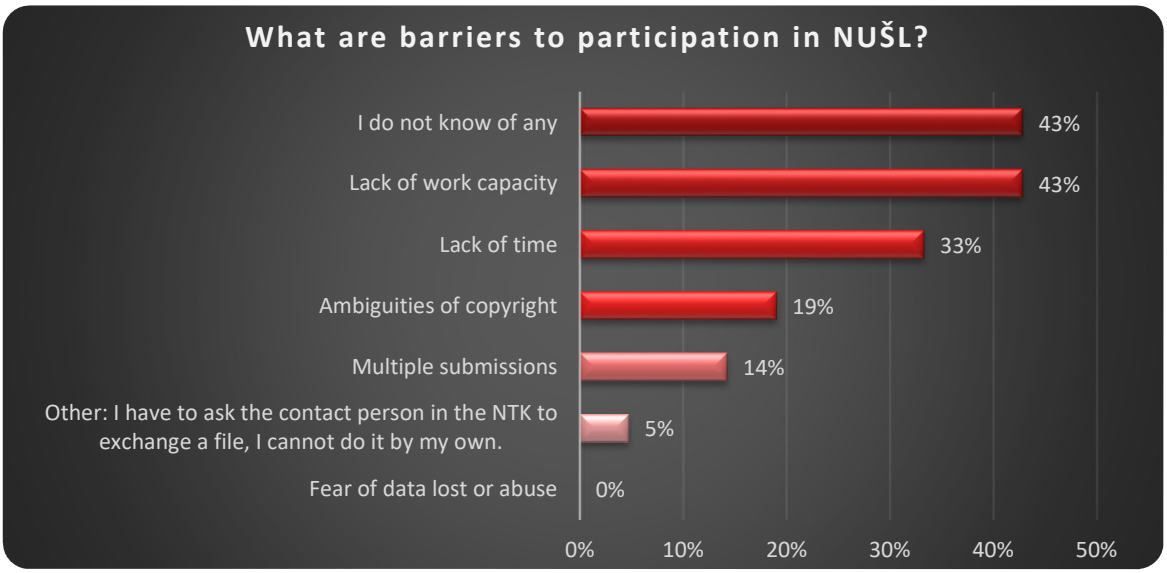


Graph 3: Overview of documents that survey respondents would be interested in making freely available

The survey also examined how satisfied stakeholders are with the allowed file formats (pdf, jpg, mp3, and mp4) in NUŠL. 86% of respondents described them as sufficient and only 14% would welcome other formats, namely png, csv, xlsx/xls, docx/doc, ppt, zip. Thus, both formats typical for data (csv, zip and xlsx/xls) and formats not recommended for long-term archiving (docx/doc, ppt and xlsx/xls) appeared. Therefore, we will only include png from suggested to allowed formats for the Czech National Repository, because data storage is not within scope of the planned transformation. Set up processes for data sets would significantly slow down development of the repository.

Focus on data is not possible now due to the need to migrate rapidly to a new version of the repository software, as described above.

The last question in the survey aimed at identifying barriers to depositing documents in NUŠL (see Graph 4); multiple responses were possible. We were surprised that 43% of respondents did not perceive any barriers to deposit in NUŠL. The other most frequently chosen options were: labor shortages (43%) and lack of time (33%). The low number (14%) of "multiple submission" limitations was also surprising. The reason may be that NUŠL submitters do may not be in charge of submissions into the R&D System or other internal institutional systems.



Graph 4: Obstacles in depositing documents into NUŠL

New Typology

In the subsequent creation of a new typology, we relied on the survey mentioned above, our experience from previous communications with partner institutions, the current representation of types collected in NUŠL so far, and a comparative analysis of the typologies applied in the following systems: Institutional Repository of the Academy of Sciences of the Czech Republic, OpenAIRE, Zenodo, the Czech R&D System, and the Charles University Digital Repository. The aim was to find a compromise connecting all of these.

Crucial to this process was the inclusion of published document types, so-called "white literature": articles (in any version), books, their chapters, and reviews. We asked for feedback on the draft version of the new typology by selected representatives of partner institutions. Based on their feedback, some categories were further generalized to facilitate more rapid orientation in the typology and to avoid unnecessary fragmentation for types which users have difficulty understanding the distinctions of such as studies and analysis or statistical and status reports.

The final typology is shown in Figure 2**.** "White literature" does not have a broader category; a user-friendly and sufficiently concise label was not found. The categories "ETDs" and "conference materials" did not change. We transformed "methodological and analytical materials" into a category entitled "methodologies and procedures" because these are often used by NUŠL partners that created a certified methodology under the Ministry of Culture, due to the mandatory deposit requirements mentioned above. Despite major changes, the "reports" category still has more than five types. Several original types were merged or transferred because they are difficult to distinguish or are rarely used (survey reports, technical reports). New document types

were added to the typology, including field and conservation reports, which could be provided by heritage institutions or institutions focused on history and archeology. Annex 1 provides a complete overview of changes in the document typology.

The last category groups the remaining GL document types. It contains five types - trade literature (now encompasses many original NUŠL types, see Annex 1), studies and analyzes, exhibition catalogs, and newly added specialized maps and educational materials. Labeling this category "other" was excluded due to its ambiguity, as was the label "grey literature" with regard to given the circumstances and facts described above (it has a similar information value for nonprofessionals as "others"). We found inspiration in the Gambling Research Exchange (GREO) in Canada, where they faced similar problem in the presentation of GL in the GREO digital library in 2017. They renamed the GL category "specialized resources." This change increased access to the digital library. (Baxter, Hilbrecht 2020) Thus, we decided to follow best practices and to present this category as "other specialized materials."

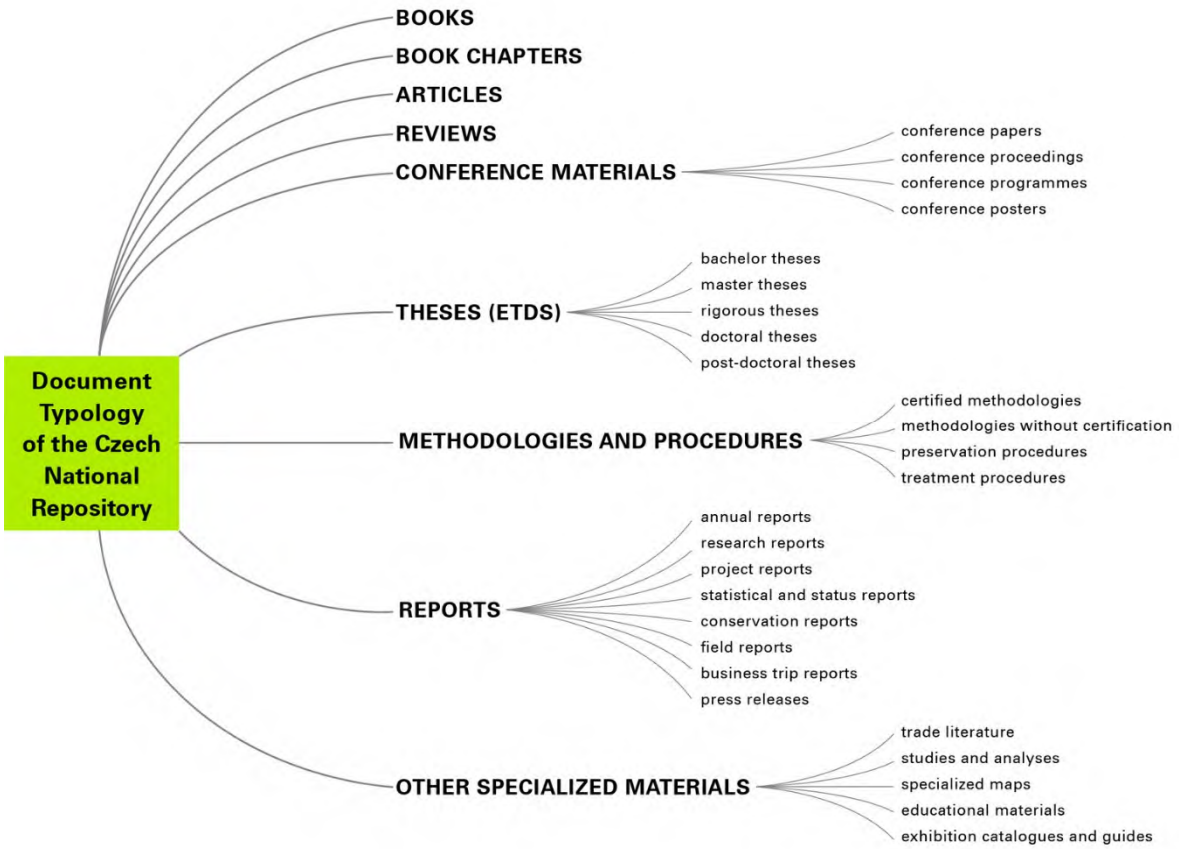


Figure 2: the Czech National Repository document typology

An analysis for the original NUŠL typology revealed that most GL databases do not include patents and that these are usually managed by other information resources (State Technical Library 2009b). In the Czech Republic, patents are typically included in the well-known Industrial Property Office databases.[18] Thus, we did not consider including patents in the new typology.

We hope the new typology will enable better user orientation and decision-making regarding document types and improve the user experience of the service.

[18] Available from https://upv.cz/en/client-services/online-databases.html

Conclusion

NUŠL was established as a special project (2008-2011) and has been in full operation since 2012. Over time, various service modifications have been made. However, Invenio software upgrade, reflections on the further direction of GL and other external circumstances have led to the transformation of NUŠL into the Czech National Repository within a national grant project entitled "National Centre for Information Support of Research, Development, and Innovation (2021 - 2027)." NUŠL's original goals will remain, GL will still be included, and assistance to smaller institutions will be priority. The GL presentation to end users in the Czech National Repository will be different from in NUŠL. GL will disappear from the name of the repository (since "white literature" will be also collected), and the term GL will not appear in the new typology, being replaced by the designation "other specialized resources." This decision was made based on GREO best practices. End users should not encounter the term GL in the user interface, but we will continue to label documents that have not gone through the traditional publishing process as "isGL" in their metadata records. This will enable filtering and subsequent transfer of only GL to specialized databases if needed.

Work on a technical upgrade has already started. In parallel with the other changes mentioned above, this should ensure the new Czech National Repository will serve the needs of all its users: curators, submitters and end users.

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Annex 1: Changes in the document typology

Annex 1: Changes in the document typology

NUSL Typology

Parent category	Document type	Status	Note
Author works *(withdraw)*	Synopses (Referáty)	Withdraw	converted to **article in version preprint or educational materials**
	Preprints	Withdraw	converted to **article in version preprint with the GL flag**
	Thematic collections	Withdraw	converted to conference proceedings or books with the GL flag
	Monographs	Extended	for white books
Conference materials	Papers		
	Proceedings		
	Programmes		
	Posters		
Academic theses (ETDs)	Bachelor's theses	New label	
	Master's theses	New label	
	Doctoral theses		
	Rigorous theses	New label	
	Habilitation theses		
Analytical and methodological materials *(withdraw)*	Analyses	Merged	with studies
	Methods	Extracted	in a separete category and distinguish among certfied and non certified, procedures added
	Studies	Merged	with analyses
Reports	Annual reports		
	Final reports	Merged	with progress reports into project reports
	Grant reports	Withdraw	converted to project reports
	Progress reports	Merged	with final reports into project reports
	Research reports		
	Statistical reports	Merged	with status reports
	Status reports	Merged	with statistical reports
	Survey reports	Withdraw	converted to field reports
	Technical reports	Withdraw	converted to research reports
	Travel reports	New label	
Trade literature *(transformed into a type)*	Trade print	Withdraw	converted to trade literature
	Product catalogues	Withdraw	converted to trade literature
	Gazettes	Withdraw	converted to trade literature
Promotional and educational materials *(withdraw)*	Brochures	Withdraw	converted to trade literature
	Flyers	Withdraw	converted to trade literature
	Exhibition catalogues	Merged	with Exhibition guides
	Exhibition guides	Merged	with Exhibition catalogoues
	Press releases	Moved	into the reports category

Czech National Repository Typology

Parent category	Document type	Status	Note	GL indication
	books	New	includes NUSL Monographs marked GL and a part of Thematic collections	GL selectively
	book chapters	New		GL selectively
	articles	New	includes Preprints and a part of Synopses marked as preprints	GL selectively - preprint
	reviews	New		GL selectively
Conference materials	conference papers			GL selectively
	conference proceedings		includes a part of Thematic collections	GL selectively
	conference programmes			GL
	conference posters			GL
Theses (ETDs)	bachelor theses			GL
	master theses			
	rigorous theses			
	doctoral theses			
	post-doctoral theses			
Methodologies and procedures	certified methodologies	New	extracted from Methods	GL
	methodologies without certification		rest of Methods	
	preservation procedures	New		
	treatment procedures	New		
Reports	annual reports			GL
	research reports		includes Technical reports	
	project reports		merged Progress and Final reports, and Grant reports	
	statistical and status reports		merged types	
	conservation reports	New		
	field reports	New	includes Survey reports	
	business trip reports			
	press releases			
Other specialized materials	trade literature		category became a type; includes - Trade print, Product catalogues, Gazettes, Brochures and Flyers	GL
	studies and analyses		merged types	
	specialized maps	New		
	educational materials	New	includes a part of Synopses	
	exhibition catalogues and guides		merged types	

The Use and Knowledge of Slovenian University Librarians about Grey Literature

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Abstract
Access to grey literature is growing which is a result of a constant development of open science and accesssibilty of information. Since little is known about grey literature and its use in Slovenia, the aim of the study is to examine its usage, and to obtain information about acquaintance of Slovenian academic librarians with this kind of literature. The survey was conducted by using an online questionnaire adderessed to the Slovenian academic libraries. The questionnaire was designed to investigate knowledge about grey literature among academic librarians. Its goal was also to identify the categories of grey literature obtained by libraries, ways of its acquisition and classification. All 3 hypotheses were confirmed. The survey results showed that the expression grey literature is established among Slovenian academic librarians. We may confirm that academic libraries in Slovenia collect grey literature, and that it is catalogued in the Slovenian academic libraries.

Keywords: grey literature, access to knowledge, research, Slovenia, academic libraries.

Introduction

In our time, the number of information dealing with scientific, economic and technological information is constantly growing; however, it is not available to a wider circle of potential users. At the same time,numerous important information is emerging in different stages dealing with diverse researches that yet have to be published in conventional literature. Until now, they have been forwarded only by leading experts in a particular scientific field. Thus, grey literature brings the latest information from a specific scientific field. If we look at grey literature from the broadest point of view, we could say that it provides information that cannot be found anywhere else, and that it helps to get an insight into a particular era when it was produced. All grey literature gains in value over time. Of course, it is to be expected that not all of the material will be preserved, thus ,. it is important to ensure that at least part of it is preserved. Why is the importance of grey literature considerably increasing, especially in research circles? Grey literature has become the most important medium of informal scientific communication. It also plays an important cognitive and social function – which, of course, gives the stamp of a successful mediator. Grey literature is directly focused on problems that are of strategic importance for scientific research and thus significantly contributes to the effective scientific communication. Its function of transmitting the latest findings in science and practice is important as well. Grey literature has the significance of the characteristics of ephemeral material, and is of great importance especially in scientific communication (Shopfel and Farace, 2009). And as (Lawrence, Thomas, Houghton, Weldon, 2015) represent, grey literature is a term often seems to obscure more than it illuminates and defining it is notoriously difficult with hard boundaries almost impossible to draw. A commonly cited definition is that grey literature is “Information produced on all levels of government, academia, business and industry in electronic and print formats not controlled by commercial publishing i.e. where publishing is not the primary activity of the producing body”, defined at the Grey Literature Conference, Luxembourg, 1997 – expanded in New York, 2004.

Presentation of the Study Problem

The use of grey literature is very important in all libraries, as it is related to free access to information as well as to individuals looking for this category of literature. The efficiency or effectiveness of grey literature usage results from a library's attitude to such literature.

Within research on the use of grey literature in Slovenian academic libraries, we focused on the acquaintance with this type of literature, how libraries acquire it, and what types of grey literature they collect. This group of semi-published materials, which is usually intended for the narrower target group, includes: research and development reports, audits, working reports, patents, governmental and non-governmental publications, technical standards, market research, annual reports, brochures, newsletters, chronicles, conference materials (program leaflets, posters, articles), instructions for use, leaflets, internal newspapers, internal manuals, statistics, technical documentation, school products, etc. The aim of the research was to find out if librarians in academic libraries are familiar with the concept of grey literature, and what types of this literature are available in their libraries. We associate the term grey literature with mysterious material waiting in the shadows (Rucinski, 2015). Even though grey literature has existed in libraries since time immemorial, each library has treated it differently. Grey literature continues to play a vital role in the dissemination of research findings and government policy, a role that has greatly increased with the internet (Lawrence, 2012).

Aims and Objectives

The objective of the research was to examine the use of grey literature in Slovenia by means of professional literature and research, both from a theoretical and practical point of view. We also wished to analyse the current situation and find out how academic libraries in Slovenia collect grey literature.

Research Questions and Hypotheses

The research focused mainly on the question whether librarians in academic libraries are familiar with the grey literature term, what types of material are classified as grey literature, how academic libraries in Slovenia collect grey literature, how they handle it, and to what extent they digitize and catalogue it.

The subject of the research were the following hypotheses:

H1: The term grey literature is established among Slovenian librarians in academic libraries

We presume that the majority of academic librarians are familiar with the term of grey literature. We examined the hypothesis with the question whether they know the term grey literature, and whether they use any other expression for the term of grey literature?

H2: Academic libraries in Slovenia collect grey literature

We assume that most academic libraries collect grey literature and preserve /keep/ it in their libraries. Most academic libraries keep final papers of university students, at least. We explored the hypothesis with the question whether libraries collect grey literature.

H3: **Grey literature is catalogued in academic libraries in Slovenia**

The majority of grey literature are final works of faculty students, so this part of the grey literature is catalogued and recognisable. We explored the hypothesis with the question whether libraries catalogue grey literature.

The following questions relating to the research, were asked:

1. What types of grey literature are collected in Slovenian academic libraries and
2. how grey literature is acquired.

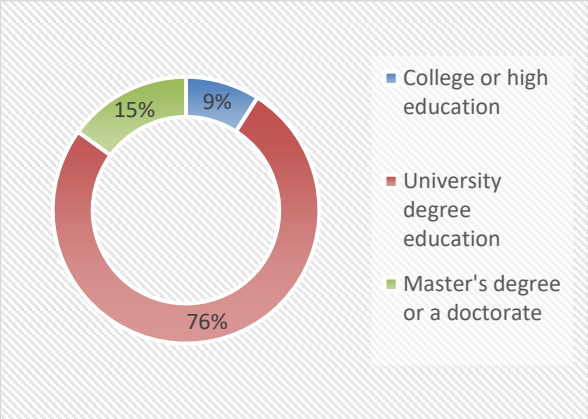
Methodology

Slovenia is a small country with a population of 2 million only; however, there are 6 universities and 40 independent higher education institutions in the country. Respondents to questions of the survey were employees of academic libraries in Slovenia. The survey was sent to 112 e-mail addresses of the Slovenian academic libraries with a request to be completed by only one employee of each library. Data collection lasted from 2 September to 10 September 2020. Although the questionnaire was sent to all academic libraries in Slovenia, only 34 surveys of 61 received, were correctly filled in. Descriptive statistics and Excel were used for data analysis.

Analysis and Interpretation of Results

Among the 34 librarians who answered the questions correctly, 6 (18%) were men and 28 were women (82%). As shown in Figure 1, majority of librarians have a university degree education (n=26, 76%), 5 librarians (15%) have a master's degree or a doctorate, and 9% (n=3) of them have a college or a higher education.

Figure 1: Academic librarians education

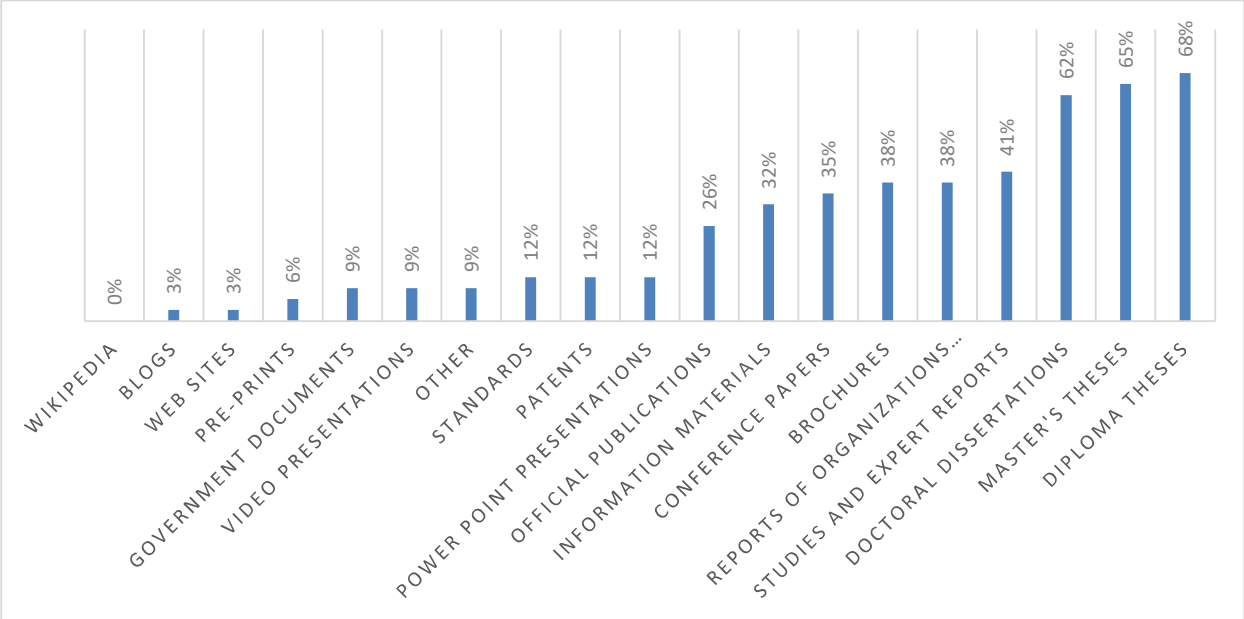


The question in which areas of the library they work offered several answers. Therefore, the final number of responses was 143, which means that librarians perform several functions, as most academic libraries employ only one librarian. As many as 62 % of them work in the field of biblio-pedagogical work with users (n=21), next is information work and a descriptive and content cataloguing, and accessing (both n=20, 59 %), followed by work in circulation service and library management (both n=19, 56%) and bibliographies recordkeeping of researchers (n=17, 50%). Fewer are involved in digitizing material and in promoting of the library. Under the legend Other, they mentioned procurement of material, promotions of professors, accreditations for a faculty, technical assessments of students' final assignments, advice to editors of journals and monographs, and assistance with publishing of an institution's activities. Librarians know the term grey literature (n=30, 88%), only 4 librarians (12%) do not know it. Librarians also use other terms than grey literature. The most well-known term is small print

(40%), then information material (33%), reference literature (30%), non-book literature (23%), ephemera (13%). As other (n=8), they listed diplomas, dissertations, final theses, curricula, teaching preparations, teaching aids. 79% (n=26) of librarians answered that their library is collecting grey literature. Half of 21% (n=7) did not specify reasons why they do not collect grey literature. Others stated that they do not collect it because they do not have such material and/or that library users show no interest for this type of material. All librarians who answered yes (they are collecting grey literature), were asked for an approximate percentage represented by grey literature in their library collection. Their assessments were very different, as most of them estimate that grey literature represents between 30 and 40% of their library collection; many estimate that the grey literature represents less than 10% of their collection.

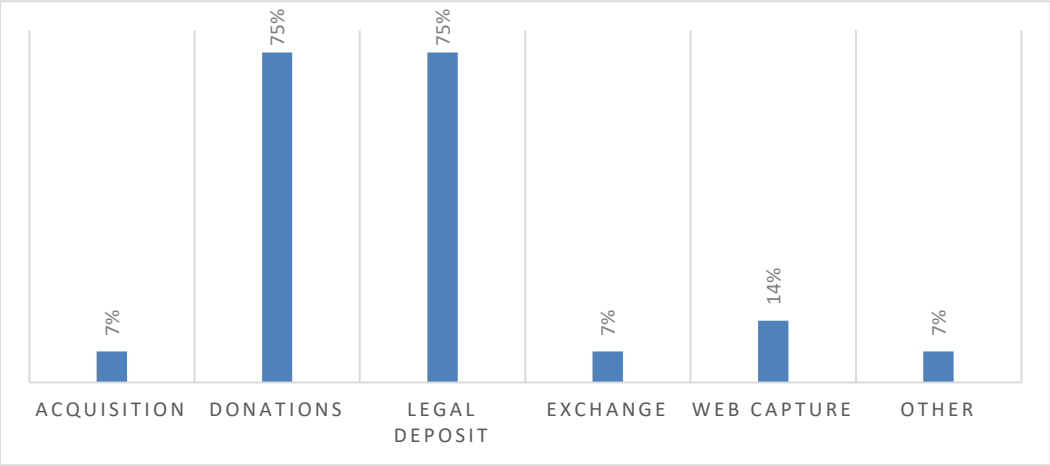
It is understandable that academic libraries collect mainly diploma theses, master's theses and doctoral dissertations. In addition, they collect studies and expert reports, brochures, reports of organizations and companies, conference papers, information material, official publications, standards, patents, Power Point presentations, government documents, video presentations, etc.

Figure 2: Types of grey literature collected in academic libraries



We also asked how do libraries obtain grey literature. In general, as seen in Figure 3, libraries obtain grey literature through donations (n=21, 75%) and legal deposit to the institution (n=21, 75 %), only a smaller number by the web capture (14%), acquisition (n=2, 7%) and exchange(n=2, 7%). Under the legend Other, they mentioned that they obtain grey literature when authors bring it into the library for cataloguing, or that they don't obtain grey literature at all.

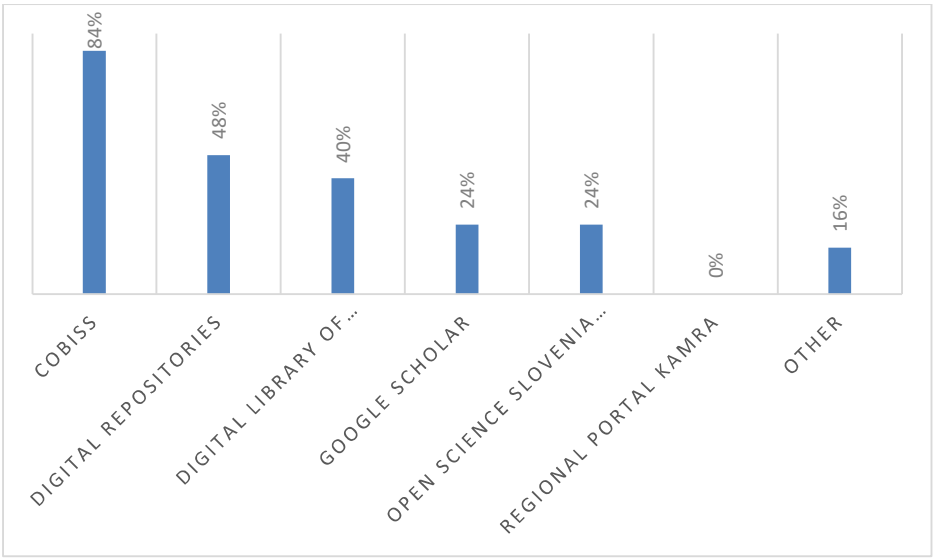
Figure 3: Obtaining grey literature



Most libraries catalogue grey literature (n=21, 75%), only 7% (n=2) of libraries do not catalogue it. However, most libraries do not digitize grey literature (n=16, 59% frequency), they digitize it in 26 % (n=7). The answer "Other" explains that librarians do not digitize all grey literature, or only to some extent (n=4, 15%), as students' final works are available in e-form via a faculty's website, thus students have to submit a legal deposit copy to the digital repository.

The question"what resources do you use to help you find grey literature?", offered several answers. As seen in Figure 4, for searching information resources, libraries most often (n=21, 84 %) use the COBISS system (Slovenian national Co-operative bibliographic system & services), next are digital repositories (n=12, 48%), the Digital Library of Slovenia (n=10, 40%), the Open Science Slovenia Portal (n=6, 24%) and the Google Scholar (n=6, 24%). Others (n=4, 7%) are using DiKUL (University of Ljubljana Digital Library), Government of Slovenia websites, conference websites, Slovenian ministry of Education, Science and Sport website, Arxiv.org etc.

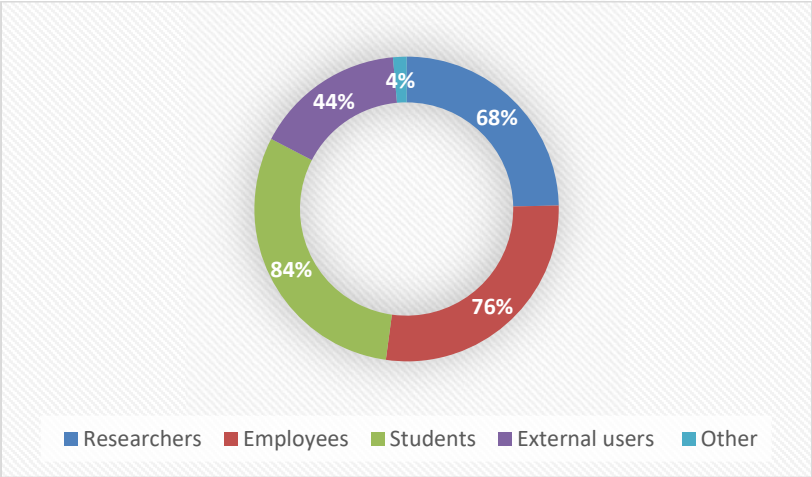
Figure 4: Resources for finding grey literature



Users mostly borrow diploma (n=17, 68 %) and master (n=17, 68 %) theses, doctoral dissertations (n=16, 64%), brochures (n=6, 24%), conference papers (n=6 24%), reports of organizations (n=5, 20%), studies, researches (n=5, 20%), official publications (n=4, 16%), government documents (n=2, 8%), standards (n=2, 8%), blogs (n=1, 4%), patents (n=1, 4%), etc. In some libraries, grey literature is not available for loan, or users can access it via a website in e-format.

When asked who are users of grey literature in academic libraries, the majority of respondents answered that the most common users are students (n= 21, 84%), employees of the institution (n=19, 76%), researchers (n=17, 68%) and external users of the library (n=11, 44 %).

Figure 5: Grey literature users



We were also interested in how academic libraries promote grey literature. The highest number of answers was given in section Other (n=13, 57%). They specified that they do not promote grey literature, or they promote it during lectures for students; however, they catalogue it in the COBISS or in repositories, present them on lists of newly obtained material. Six libraries (26%) use their website for promotion - such as newsletters, two libraries (9%) promote grey literature via exhibitions and one library promotes grey literature by using a selective dissemination of information (4%).
Based on the analysis and interpretation of the acquired results, we were able to confirm all three hypotheses:

1. The "grey literature" expression is established among Slovenian academic librarians; as many as 30 librarians answered to the question (n=30, 88%) with "yes"; librarians also use other terms such as small prints, ephemera, reference literature, information material.
2. The second hypothesis "academic libraries in Slovenia collect grey literature" can also be confirmed, as 26 librarians answered "yes" (n=26, 79%).
3. The third hypothesis "grey literature is catalogued in academic libraries in Slovenia" can be confirmed, as 75% (n=21) of libraries that completed the survey answered "yes".

Discussion

The survey was sent to 112 e-mail addresses, of which only 34 surveys, or 30%, were correctly completed. The most likely reason for low response is the fact that in Slovenia the school year of universities and colleges begins on the 1st of October. In September, academic librarians are mainly engaged in the preparations for the new academic year, and with completing works of the preceding year. This primarily refers to the large volume of final assignments that librarians need to technically review, and to catalogue them. Due to all problems caused by the coronavirus epidemic, we were unable to send surveys in June; the following month, the summer vacation began. Nevertheless, we estimate that a relatively small sample of answers has provided credible results.

The surveys indicate that Slovenian academic librarians are familiar with grey literature. One of the reasons is also the fact that final works of undergraduate and postgraduate students represent a large part of a library collection. It might be estimated that legal deposit and gifts are the most frequent means of obtaining grey literature. However, final works represent the largest part of grey literature that users borrow. In the future, we would like to get more information about other types of grey literature collected in academic libraries. In addition, we would like to point out a small percentage of libraries that digitize grey literature. In most libraries, only students' final works are available in e-form (repositories), other forms represent only a small scope of grey literature. What are the reasons? One of the reasons is that other forms of grey literature represent only a small part of a library collection. Is grey literature not interesting enough for users? If so, it is most probably due to the fact that many academic libraries are understaffed, and librarians have no time for digitization. They are primarily engaged by providing requested material to users, with cataloguing a library's material and researchers' bibliographies. The same problem refers also to the promotion of grey literature; however, it is presented in the lists of newly obtained library material.

Conclusion

The survey questionnaire was drawn up in a way to obtain answers to basic questions; no such survey has been conducted in Slovenia so far. The survey opens many new areas of research, especially in connection with to grey literature management in academic libraries, and from the point of view of grey literature's applicability for researchers. In the future, we are planning a survey on the use of grey literature in public and school libraries, where information material is more accessible. Comparable surveys in different types of libraries also enable comparison of researches.

It can be concluded that the term grey literature is used by librarians of the Slovenian academic libraries. They also use other terms, such as small print, information material or reference material. As 30-40% of library collections represent grey literature, it is important to collect and catalogue it and to offer libraries' users access to such materials. In Slovenia, most libraries in public institutions joined COBISS (Co-operative bibliographic system and services). Since libraries are cataloguing grey literature, their materials are widely accessible. If grey literature is not available in a library, a user can request it thought the interlibrary loan. Students are the most common users of grey literature, so libraries also educate them how to navigate in the COBISS system. When we catalogue grey literature (Ranger, 2005) we add value to grey literature. By cataloguing, itbecomes more visible and accessible.

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GreyLitGuides.com: A revised resource for grey literature education and training

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Abstract

The grey literature is a valuable body of information that is a necessary component to any evidence-based approach to solving multifaceted social problems. However, the concept of grey literature is complex and precise (Schöpfel, 2010) with one of the defining factors being that it is difficult to find due to the nature of its publication. Thus, the topic can be unapproachable for unfamiliar audiences who could make good use of it. Therefore, it is important to provide high-quality, contextualized educational materials that explain what grey literature is, why it is valuable, and how to find it.

At the GL2020 Conference, we presented the creation and recent revision of GreyLitGuides.com, a contextualized directory of grey literature educational resources with an emphasis on LibGuides and videos. This resource draws from an environmental scan of grey literature LibGuides presented at GL19 (Carlson, Schöpfel, & Vaska, 2017). The results were first categorized into major headings based on anticipated grey literature knowledge needs: 1) what is grey literature, 2) how to find grey literature, and 3) subject-specific sources of grey literature. The website was launched in 2019 and announced at the GL21 conference.

In 2020, the GreyNet Education & Training Committee reviewed the resources in detail to create annotations for the directory and added new resources through consultation with GreyNet affiliates via an online survey. The purpose of the survey was two-fold: (1) to encourage affiliates to share resources that they had personally found to be useful for education and training purposes, and (2) to determine how the GreyLitGuides.com website could be enhanced to meet affiliates' information needs for grey literature education and training. The survey brought new and previously overlooked materials to our attention, which were highlighted in our presentation. It also shed new light on occupational groups, beyond information professionals, that take an active role in grey literature education and training. The results allowed the committee to add new material to the website, and gain insight into preferred information formats, and understand where to focus their dissemination efforts.

Background

Grey literature is a valuable body of information that is a necessary component to any evidence-based approach to solving multifaceted social problems. Grey documents complement traditional primary publications as they often cover different areas within a given topic or different topics altogether, have a higher level of detail, can be more up-to-date, and are typically not subject to publication bias toward statistically significant results, amongst other benefits (Bonato, 2018). Grey literature is important to various research disciplines. For example, it has been a vital method of publication for international research on nuclear energy (Savic, 2020). Within the health research community, it is considered best practice to include grey literature searches in knowledge syntheses such as systematic reviews (Hopewell, McDonald, Clarke, & Egger,

2007). Grey literature is also an increasingly important source of evidence for informing public policy decisions in a variety of domains (Gul, Shah Tariq, Ahmad, Gulzar, & Shabir, 2020), from environmental sciences (Cossarini, MacDonald, & Wells, 2014) to alcohol and gambling harm reduction programs (Baxter & Hilbrecht, 2020; Brooks, Kassam, Salvalaggio, & Hyshka, 2018).

Despite the benefits of grey literature, it is often overlooked or excluded from knowledge syntheses because it may be labour intensive to search and requires specialized knowledge to search effectively (Godin, Stapleton, Kirkpatrick, Hanning, & Leatherdale, 2015). In addition to potential search and retrieval challenges, another concern with grey literature is that the concept of grey literature itself has necessarily evolved over time and become more complex and precise (see Schöpfel, 2010). This adds another layer of challenge to newcomers to the topic.

It is part of GreyNet International's mandate to address these challenges through education. (GreyNet International, 2020). To better facilitate grey literature learning and use, GreyNet's Education and Training (E&T) Committee maintains a directory of grey literature educational materials. The directory began with an environmental scan of LibGuides resources that give significant attention to grey literature. LibGuides is a popular proprietary content management system for libraries to create and maintain online resources such as subject guides and course materials (https://www.springshare.com/libguides/). This scan was conducted in 2017, published on a Blogger webpage, and presented at the GL19 conference (Carlson et al., 2017). Following a committee refresh in 2018, the directory was converted to a standalone WordPress website with resources organized into separate pages for different topics, such as "finding grey literature" and "grey literature repositories". This website, called GreyLitGuides (www.greylitguides.com), was launched in 2019 and announced at the GL21 conference (Vaska, Baxter, Bonato, Dorris, & Hilbrecht, 2019).

For 2020, the GreyNet E&T Committee's goal was to revise the website's structure and contents informed by consultation with GreyNet members and affiliates via an online survey. This paper describes the online community survey, how the results informed revisions to the GreyLitGuides website, and how they will guide the Committee's next steps in 2021.

Approach

To help fulfill GreyNet's mandate for grey literature education, the E&T Committee agreed that a member survey would be the most expedient and useful way to gather relevant information about new education and training resources, as well as user experiences of the newly revised website format. The purpose of the survey was two-fold: (1) to encourage affiliates to share resources that they had personally found to be useful for education and training purposes, and (2) to determine how the GreyLitGuides.com website could be enhanced to meet affiliates' information needs for grey literature education and training.

One member of the E & T Committee was responsible for designing the initial survey and creating an online version of it using Qualtrics software. The other members reviewed the draft and provided suggestions for improvement. The survey was divided into three sections: participants' employment characteristics, content suggestions, and feedback about the Grey Literature Guides website. A final question elicited information about whether the participant would be willing to be personally contacted should the E & T Committee wish to learn more about the participant's grey literature education and training experiences. The full survey is presented in the Appendix.

The survey was initially pilot-tested and minor revisions were undertaken prior to distribution. As an incentive for participation, GreyNet generously donated a one-year subscription to *The Grey Journal* (a €240 value) as a prize for survey participants who wished to be included in a draw.

The survey opened on May 4, 2020. An invitation to participate in an online survey and the URL link was distributed by Dominic Farace, Director of GreyNet, via GreyNet's Distribution List and social media (including Facebook and LinkedIn). Follow-up survey reminders were similarly distributed on May 18, June 1, and June 10, 2020. The stated survey closing date was six weeks later on June 15, 2020, although responses continued to trickle in until June 26, 2020 when the survey was officially closed in Qualtrics. Of the 55 responses received, 31 were deemed usable (i.e., more than 60% of the survey had been completed). Eleven people had clicked on the link but did not begin the survey, nine completed the first section only (less than 25% of the survey) and four responses were from spam addresses and unusable. Although this constitutes a low response rate in terms of usable surveys, a considerable amount of information was provided by the 31 participants to assist in enhancing the Grey Literature Guides website. This information is described in the findings below. Examples drawn from responses to open-ended questions, where provided, are presented verbatim.

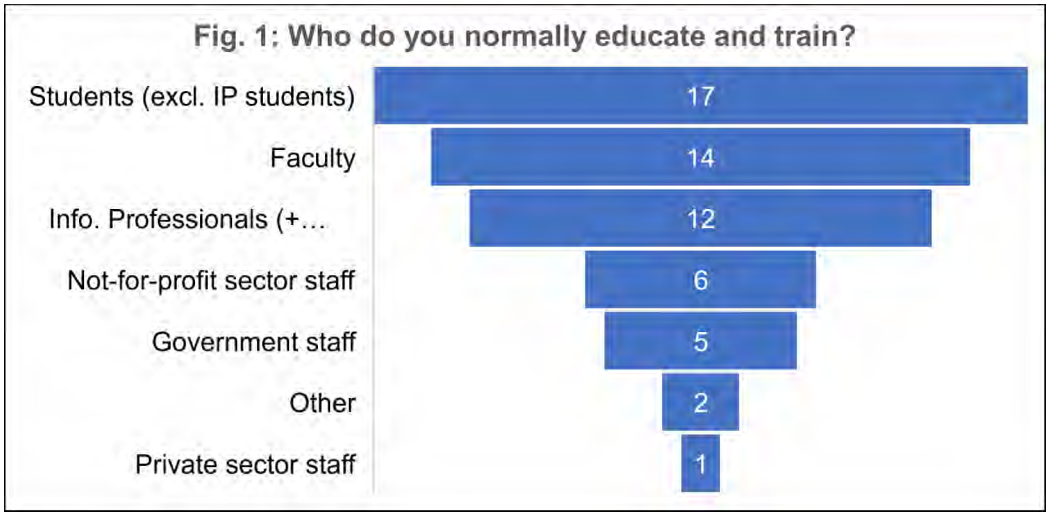
Survey Results

The survey sections, "You and your work", Education and training materials", and the "Grey Literature Guides" website are presented in turn, providing information about participants, suggested new materials and, finally, options the E & T Committee could act upon to enhance the website and the user experience.

You and your work

Most survey participants were Information Professionals (*N* = 15), fewer than one quarter were faculty or students (*N* = 7), another seven worked for the government or non-profit sector, one was a consultant, and another described their category as "other" and worked at a national research council library. Participants were asked to indicate how long they had been helping others to learn about grey literature. Excluding three people who were not involved in education and training, the median response was between 11 to 15 years. A diverse range of experience was represented. For example, there were almost equal numbers of people had been training others for 5 years or less (*N* = 8) or more than 20 years (*N* = 9).

Of the groups that participants normally educate and train in the use of grey literature, three emerged most often. They included students (*N* = 17), faculty (*N* = 14), and information professionals (IP) (*N* =12) (see Fig. 1). Four other groups were represented, in decreasing order of mention: not-for-profit sector staff, government staff, 'other', and private sector staff. No further information was provided about the 'other' group.



Education and training materials

Participants were asked to think about materials that they had found helpful when learning or teaching about grey literature. This allowed the Committee to gather content recommendations for new resources. To provide context, materials could be used for personal learning, to train information professionals and students, or to advance understanding and use of grey literature among people who are not information professionals. The response options were open-ended for six subcategories, including (1) LibGuides, resource guides, and online pathfinders/portals; (2) videos, webinars; (3) books (including eBooks); (4) journal articles (including eJournals); (5) conference proceedings, conference papers, theses; and (6) other. Table 1 summarizes the number of submissions for each category. Since participants sometimes shared the same suggestion(s), the number of submissions after duplicates were removed are also listed. Overall, the survey generated 107 recommended resources, minus the duplicates, for a total of 58 unique responses. The most common resource type suggested was *Resource guides, LibGuides, and online pathfinder/portals*.

Table 1: Resource type and number of submissions

Resource type	Total submissions	Submissions minus duplicates
Resource guides, LibGuides, and online pathfinders/portals	32	20
Videos, webinars	8	8
Books	17	9
Journal articles	12	6
Conference proceedings and papers, theses	22	5
Other	16	10
Total	**107**	**58**

Most duplicate entries related to existing grey literature organizations: GreyNet International, OpenGrey and the National Repository of Grey Literature (e.g., Grey Guide,

Open Grey, Grey Literature Repository). Books with multiple entries included *Grey Literature in Library and Information Studies* (Farace & Schöpfel, 2010), *Searching the Grey Literature* (Bonato, 2018) and *Grey Literature Repositories* (Pejšová, 2010). Committee members then checked the existing website for any duplication of old and new resources. Resources that were added to the Grey Literature Guides website are highlighted in the New Resources section that follows.

Grey Literature Guides Website

Participants were directed to explore the website in order to answer questions related to its organization and utility. When asked whether it was their first visit to the website, 16 participants indicated that it was not, 11 responded that it was, and one was unsure. Three participants did not respond.

Most participants (*N* =18) found the website to be very or extremely useful. Ten found it moderately useful. Only one reported that it was not at all useful; however, this participant had indicated earlier that their field was dominated by grey literature so people working in the area were required to be conversant in it.

Of the twenty-five participants who responded to the question about recommended website improvements, 18 had no suggestions and the remaining seven provided some. For example, one participant noted, “I think it would be helpful to have a brief commentary on each of these categories: "Introduction to Grey Literature", "Finding Grey Literature", "Sources of Grey Literature" and "Other Subject Areas", while another suggested, “Organization by document type, or a sort of "suggested reading order" that goes from general to specific may be helpful. The country organization is, however, very useful for the lists of specific grey literature sources.”

Participants were then asked if any additions could be made to the types of resources included on the website. Eleven had no suggestions, but 14 provided input in this area. Examples of suggestions for additional information types include “Infographics”, “Data papers”, “Lecture videos, syllabus and power point slides by GL conference participants to understand the characteristics of the grey literature”, and “Training guides and other resources for GL beginners.”

The final question asked participants to share any feedback they might have to help the E&T Committee improve the Grey Literature Guides website for their training, education, and learning needs. Seven people provided feedback. Some examples of comments were “Resources from some other countries (if available)”, and “I also wouldn't mind seeing materials in other languages because so many of the GreyNet Members are active in other countries and speak English as a second language”.

Future contact

At the suggestion of Dominic Farace, a final question was added regarding whether participants would be willing to be contacted in future about their Grey Literature education and training experiences. Most (*N* = 18) agreed to be contacted, and 11 did not. The list of names and contact information was shared with the E & T Committee Chair and is pending further discussion of how this information might be used.

In summary, participants provided an array of helpful suggestions that will help to enhance the website and make it a more useful resource for members when searching for education and training materials. Still, it should be noted that the low level of survey participation precludes a wider range of suggested new materials and website enhancements, or may be biased toward the opinions of those who are more likely to respond to surveys.

Website Revisions

New Resources

The original GreyLitGuides directory was based on an environmental scan of LibGuides resources that gave attention to grey literature. Thus, the participants overwhelmingly noted that the website did not contain major grey literature resources developed by the grey literature community of practice. Community resources including GreyNet resources such as *The Grey Journal*, the GreyGuide Portal and Repository, and edited volumes produced by community (Farace & Schöpfel, 2010; Pejšová, 2010), were added to the site. As these resources are more detailed than the introductory and educational materials on the site, many were added to new sections titled “Further Resources” and “Grey Literature Research”, indicating they are for users who have already learned the basics of grey literature. These sections also contain links to other academic journals that cover grey literature, and resources from the *International Conference on Grey Literature*, the *Conference on Grey Literature and Repositories*.

Another type of resource that was often recommended was theses and dissertations as a type of grey literature. This warranted a new page devoted to theses and dissertations under the “Sources of Grey Literature” section, which includes explanatory text and links to three international indexes for theses and dissertations.

Various other individual resources were added to the website. Of particular note are the Grey Matters Checklist and AACODS Checklist (CADTH, 2019; Tyndall, 2010). These are popular tools for searching and evaluating grey literature and are likely to be useful to practitioners using the site.

Website structure

The survey participants did not provide any direct suggestions for changing the overall structure of the website, however one suggested adding more video materials, noting that “something with a human voice or a sense of teaching/‘talking through’ would be good as the current contents are mostly LibGuides which are more like reference documents”. Although we were unable to produce new audio or video content in advance of the conference, we did add an existing video tutorial and revised the website to provide a more narrative experience.

Firstly, we renamed the page “Introduction to Grey Literature” to “Start Here”, to give new users a sense that they are being guided. This page includes an introduction tutorial video, the 2004 expanded Luxembourg definition of grey literature (i.e., "*information produced on all levels of government, academics, business and industry in electronic and print formats not controlled by commercial publishing, where publishing is not the primary activity of the producing body*"), and examples of grey literature document types with reference to the “Document Types in Grey Literature” webpage managed by GreyNet (GreyNet International, n.d.). The Luxembourg definition was selected in favour of the currently accepted 2010 Prague definition (Schöpfel, 2010) as the former is relatively simple and better for introducing the concept to new audiences.

Secondly, as we reviewed the existing website contents and added new resources, we revised the pages with written descriptions of each topic and resource linked, thus transforming the website from a simple directory to an annotated bibliography with a more narrative quality.

This process provided an opportunity to assess existing references in closer detail. Another common request was to have more resources from more countries. The process allowed us to identify resources from underrepresented countries that were high quality and/or make a unique contribution to the site. As a result, the website presents a better balance of resources from different countries, based on what was already present on the

site or suggested through the survey. We were also able to identify and remove repetitive materials. For example, many LibGuides referred to "Grey Literature in the Research Process", and were in fact all adapted from a single LibGuide from Johnson & Wales University ("Research Process: A Step-By-Step Guide" n.d.). The other LibGuides are still listed as they list different sources of grey literature, but the webpage is much cleaner and provides proper context for what is listed.

Next Steps

As a result of our community consultation, the E&T Committee has revised GreyLitGuides.com to create an educational resource that is cleaner and more usable for users who teach or train others on the topic of grey literature. There are also several potential areas for improvement. Several participants indicated interest in resources from more countries and in languages other than English. Although we endeavoured to make GreyLitGuides as multinational as possible using the website's existing content and new resources suggested through the survey, there are still many countries and languages that are not represented on the site. The GreyNet community membership covers many countries however the current E&T Committee consists of members from Canada and the United States, so the website has focused heavily on English language resources.

There are also several information types that were requested by respondents but are not yet well-represented on the website. These include infographics, syllabi, training guides for beginners, lecture videos with slides, and other videos and tutorials. In some cases, there may be existing high quality materials that the E&T Committee and survey participants are not yet aware of, but it is also likely that certain types of educational materials have not yet been created and made freely available. Thus, there are opportunities for the E&T Committee to continue working toward its mandate by continuing to find new educational materials, evaluating and promoting non-English-language materials, or creating new content for types that are simply unavailable otherwise.

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Appendix

GreyNet - Education & Training Website Survey

This survey is designed to identify resources GreyNet affiliates use to support learning about grey literature.

This will help to ensure that the Grey Literature Guides website provides relevant resources with the potential to benefit anyone in the grey literature community.

We would be grateful if you could complete this survey.

You and your work

Which category of work best describes you?
Mark only one category.

- Information professional (IP)
- Faculty
- Student
- Government
- Private sector
- Not-for-profit sector
- Consultant
- Other (please specify) _____

How long have you been involved in **helping others learn** about grey literature?
This applies to anyone you interact with professionally on a regular basis (e.g., students, researchers, clients, patients, etc.)

- Not involved in grey literature training or education
- 5 years or less
- 6 - 10 years
- 11 - 15 years
- 16 - 20 years
- More than 20 years

Skip To: Q7 If E & T tenure = Not involved in grey literature training or education

Who do you educate and train in the use of grey literature?
Mark as many groups as apply.

- Information professionals (includes IP students)
- Students (not IP)
- Faculty
- Government staff
- Private sector staff
- Not-for-profit sector
- Other (please specify) _____

Education and training materials

Please think about **materials that you have found helpful** when learning or teaching about grey literature.
The information could be used for personal learning, to train information professionals and students, or to advance understanding and use of grey literature among people who are not information professionals.
Please list any **resources** in the categories below that you have **personally found to be helpful**, regardless of whether they are already listed on the Grey Literature Guides website.

List the resources as they come to mind. Don't worry about adding identifiers if they are not readily available. We can search for them.

a. LibGuides, resource guides, and online pathfinders/portals
b. Videos, webinars
c. Books (including eBooks)
d. Journal articles (including eJournals)
e. Conference proceedings, conference papers, theses
f. Other

_____

Grey Literature Guides Website

In this section, we are interested in your **education and training information needs**.

If you have not done so already, please take a look at the Grey Literature Guides website.
Is this the **first time** you have visited the website?

- Yes
- No
- Not sure

To what extent is the website **useful** in meeting your information needs for learning about grey literature?

- Extremely useful
- Very useful
- Moderately useful
- Slightly useful
- Not at all useful

Are there any improvements you would recommend that we make to **the way information is organized**?

- No
- Yes (please provide suggestions below) _____

Are there any additions we could make to the **types of resources** included on the website? (e.g., infographics, training guides, syllabi, etc.)?

- No
- Yes (please provide suggestions below) _____

Please share any other feedback that could **help us improve** the Grey Literature Guides website for your training, education, and learning needs.
Would you like to be entered in a draw for a one-year subscription to *The Grey Journal*?

- Yes
- No

Skip To: Q26 If Enter in draw = Yes
Skip To: Q25 If Enter in draw = No

Please provide your **name and email address** so that we can contact you if you wish to participate in the draw.
This information is for the purpose of the draw only and will not be shared with any third party organizations. ***It will be deleted from the dataset following the draw.***
Would you be willing to have us contact you in future for further information about your grey literature education and training experiences?

- No
- Yes

Skip To: Q26 If Future contact = Yes
Skip To: End of Block If Future contact = No

Please provide your name and email address so that we can contact you in future.
This information will be kept confidential and not shared with any third-party organizations.

Thank you for your participation!
You will now be automatically redirected to the GreyNet website.

Fake Science: Legal Implications in the Creation and Use of Fake Scientific Data Published as Grey Literature and Disseminated through Social Media

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Abstract

In this six-part paper, the authors first define fake science as a concept and identify at a high level the problems and consequences of fake science dissemination especially where fake science is published as grey literature and/or disseminated across social media platforms. In addition, they identify factors contributing to the creation of fake science from the "the replication crisis" in scientific research to the impact of technologies such as Artificial Intelligence. Part 2 moves into the United States Legal Landscape and considers US policy around fake science and related issues illustrated through a detailed discussion of applicable statutes and case law. Specifically, the authors discuss ISP immunity under 47 U.S.C. § 230 and the Constitutional implications of the United States v. Alverez, 132 S. Ct. 2537 (2012) and the decision and the applications of Central Hudson Gas & Electric Corp. v. Public Service Commission of New York, 447 U.S. 557 (1980). There will also be consideration of fake grey data as commercial speech or as a deceptive trade practice. Part 3 addresses the European Legal Landscape through a discussion of applicable laws and legal precedents in a similar manner to part 2. Part 4, Comparisons of the United States and European Legal Landscapes looks at the similarities and differences between the United States and Europe in addressing their shared concerns over the creation, use and dissemination of fake scientific information. Part 5, Prevention and Deterrence considers measures and actions which help to reduce the creation of fake science or that mitigate the problems it creates. These measures and actions are presented and incorporated into the fake science lifecycle presented in Part 1, Problem Definition. In Part 6, the authors make recommendations including technology driven solutions designed to ferret out fake science and in turn reducing the serious problems fake science presents. Recommendations include Facebook and other social media AI tools; manually flagging fake data; and the creation of truth seeking algorithms.

Part I Problem Definition

The term fake science is a spin-off of the phenomenon called "fake news" which while "fake" is not news at all and so too it goes for fake science. Some definitions are in order:

Research misconduct is fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results. Fabrication is making up data or results and subsequently recording or reporting these. Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented. (Office of Research Integrity, n.d.) The authors contend that research misconduct may result in "fake science".

Fake science is part of the larger universe of fake news which is shared over social media. Fake news has much in common with research misconduct. Fake news may be completely fabricated or may contain some truth, but it lacks verifiable facts or sources. Fake news may also include verifiable facts; however, the language used is inflammatory, relevant details have been left out and/or the information is from a single point of view designed to evoke a specific response from the audience. (Desai, Mooney, & Oehrli, 2020) Other definitions say fake news is is "concocted from unsourced,

unverified, often made-up information and then masterfully manipulated to pass as real and credible journalism. "(Andorfer, 2018, p. 1413) Further, the aim of fake news is to "intentionally deceive those who read it." (Andorfer, 2018, p. 1413) Fake science dissemination, just like fake news dissemination, is the practice of spreading misinformation or disinformation.

Fake science may appear in peer-reviewed journals, popular press articles, or it may appear in grey literature. Grey literature which herein is defined as "any recorded, referable and sustainable data or information resource of current or future value, made publicly available without a traditional peer-review process" (Slavic, 2018).

The peer review process in simplest terms is an evaluation of one's scientific, academic or professional work by others in the same field--hence the peer-reviewed journal. Publication in peer reviewed journals is critical to career advancement in the academy. Peer review is not without its critics; nonetheless, it is well-entrenched, and therefore everyone is striving to be published at the required pace to achieve career success. Publish or perish as they say. Complicating an already pressure-filled publication model is the replication or reproducibility crisis under discussion over roughly the last decade. This crisis, according to Stanford's Encyclopedia of Philsophy is, collectively:

- the absence of published replication studies;
- widespread inability to reproduced studies previously published;
- evidence of publication bias;
- high prevalence of "questionable research practices" which inflate false positives; and
- the lack of transparency and completeness in the reporting of methods, data and analysis in scientific publication. (Fidler & Wilcox, 2018)

Some commentators recognize how the replication crisis created a space for improvement while also recognizing that any replication experiment is a challenge in and of itself. Particularly important to notions of what is fake science, Collins holds that where a conflict of results arises, scientists tend to fraction into two groups, each holding opposing interpretations of the results where such groups are "determined" and the "controversy runs deep" and importantly, the dispute between the groups cannot be resolved via further experimentation. (as cited in Fidler & Wilcox, 2018) In such cases, Collins claims that non-epistemic factors, the career, social and cognitive interests of the scientists, their reputation and that of their institutions, will partly determine which interpretation becomes the lasting view. (as cited in Fidler & Wilcox, 2018)

There are several well-recognized examples of fake science' that have been disseminated across social media and continue to influence public behavior long-after these flaws if not outright falsification of data has been exposed. Three exemplars:

Andrew Wakefield published an article in 1998 that linked autism to the measles, mumps and rubella vaccine. His study was a catalyst that led thousands of parents to stop vaccinating their children: a collective decision that left a resurgence of the measles in its aftermath. This happened despite Britain's General Medical Council ruling that "*the children that Wakefield studied were carefully selected and some of Wakefield's research was funded by lawyers acting for parents who were involved in lawsuits against vaccine manufacturers*." and a belated retraction of Wakefield's article by the Lancet in 2010. (Eggertson, 2010, p. E199) The antivaccination trend continues to be a cause célèbre. Advocacy groups and parents including celebrities continue to believe in Wakefield's work and continue to share misinformation across social media. In addition, there is a prevailing conspiracy theory that vaccine manufacturers are hiding the truth about the

connection between the MMR vaccine and autism. "*This consipiracy is fuelled by parents' understandable longing to know the cause of their child's autism*", says Margaret Spoelstra, executive director of Autism Ontario despite the fact that no large study has replicated Wakefield's findings. "*We know that autism has a genetic cause and that there are environmental factors that we don't understand yet*," Spoelstra says. "*There's enormous pressure in the field to come up with those answers*." (Eggertson, 2010, p. E200)

Judy Mikovitz studied human retroviruses in the late 1980s and 1990s at the National Cancer Insitute before moving on to private research at the Whittemore Peterson Institute. (Neil & Campbell, 2020, p. 546). In the early 2000s, she gained recognition when she found evidence of a particular virus, XMRV, in the blood of patients who were suffering from chronic fatigue syndrome. There was a great deal of excitement around this discovery and many scientists began work to replicate her findings. (Neil & Campbell, 2020, p 546). Endeavors to replicate Mikovitz' work led to the conclusion that the blood samples used in the questionable study had been contanimated by the XMRV virus rather than the infection being present in the majority of the chronic fatigue research subjects. (Neil & Campbell, 2020, p 547) In addition, there was strong evidence that the data had been deliberated falsified. The entire incident was mired in scanda as well as another conspiracy theory manifesting. To wit, the scientific establishment is suppressing Mikowitz' findings. (Neil & Campbell, 2020, p 547) In the end, Science, the journal that published Mikowitz' study, took "*the highly unusual step of retracting the whole article without Mikovits or the Whittemore Peterson Institute's agreement because it became clear that the study was fraudulent and scientifically invalid*." (Neil & Campbell, 2020, p 548)

More recently, Mikovitz is responsible for a documentary about the COVID-19 pandemic which has been blocked by social media sites like Facebook including YouTube where "Plandemic" first premeried. YouTube quickly withdrew the documentary citing violation of its misinformation policies; however, contemporaneous reporting through news media outlets indicate that at least a million viewers had watched the first part of the documentary before the video was taken down. Plandemic II or "Plandemic: Indoctrination" expands claims that the COVID-19 pandemic was a "planned event". Although certain local media across the United States were said to be airing the documentary, this did not happen. Plandemic: Indoctrination is currently available only on two social media sites. (Spencer, McDonald, & Fichera, 2020)

"The story of broken windows is a story of our fascination with easy fixes and seductive theories. Once an idea like that takes hold, it's nearly impossible to get the genie back in the bottle." (Shankar et al., 2016) In 1982, long before social media made its debut, Criminologists George L. Kelling and James Q. Wilson proposed a theory linking disorder and incivility with more serious crime in an article published in The Atlantic entitled, Broken Windows The police and neighborhood safety. In the article, the two proposed a theory linking disorder and incivility with more serious crime using broken windows as a metaphpor. (McKee, 2018). The thinking was, if neighborhoods showed signs of neglect and petty crime was abundant, this would signal that the neighborhood was uncared for and furthermore, that it would behoove local law enforcement to address these smaller problems. To do so would result in a contraction of more serious crime while also empowering neighborhoods (Shankar et al., 2016). Both law enforcement and the public were enthusiastic about this approach, and especially relevant here, the science moved out of the academy and into popular press. (Shankar et al., 2016) This theory would be embraced in 1993 by the newly elected Mayor of New York City, Rudy Guiliani, who had

run on a tough on crime platform. Guilliani and his Chief of Police, William Bratton applied the theory to New York City's policing practice and by 2001 had become one of Guiliani's crowning achievements. (Shankar et al., 2016) Meantime, Kelling and Wilson continued their work publishing another study in 2001 which provided additional support that the crime theory was working. Subsequent re-analyis has found flaws in this work. Even the most promising study by political scientist Wesley Skogan, recommended that the broken window study results be interpreted with caution. (McKee, 2018) However, Columbia Law Professor Bernard Harcourt found that the link between neighborhood disorder and crime, namely purse snatching, assault, rape, and burglary vanished when poverty, neighborhood stability, and race were statistically controlled. (McKee, 2018) In addition, Hartcourt is particularly concerned about the theory in that it fostered zero-tolerance policies which are biased against disadvantaged segments of society. (McKee, 2018). Over time, Kelling himself thought it might be a good idea to move away from the theory*, "It's to the point now where I wonder if we should back away from the metaphor of broken windows. We didn't know how powerful it was going to be. It simplified, it was easy to communicate, a lot of people got it as a result of the metaphor. It was attractive for a long time. But as you know, metaphors can wear out and become stale."* (Shankar et al., 2016) The theory remains popular despite evidence that says at best the theory may have a modest impact on crime. One reason may be that we have no clear explanation of what reduced violent crime in the 1990s. (Shankar et al., 2016)

These examples could easily be construed as sensationalism and to some extent this is a fair point. After all, this is the nature of fake science and broadly, fake news. The impact on the public especially on vulnerable groups is one of the reasons why this is a problem that needs exploration and study.

As a starting point, let's consider the depth and breadth of retractions as well as the time frames from original publication of scientific studies to published retractions described below. It is easy to imagine what could happen in the interim, the time in which the science is believed to be credible and is shared often unquestioningly tthrough social media.

As of August 31, 2020, The Retraction Watch Database includes over 20,000 retractions. These are primarily peer-reviewed journal articles and the numbers themselve should give everyone pause. Some specifics related to our examples.

- Retractions based on contamination of cell lines/tissues, 60 instances
- Retractions based on concerns/issues on data, the first 600 instances were displayed when limiting using this filter
- Retractions based on concerns about results, the first 600 instances were displayed when limiting using this filter

The ten most highly cited studies as of May 2019 found in the database have been cited hundreds of times and in some cases more than a thousand times. These studies continue to be cited after the retraction is made although the nature of these citations, reporting out on the study flaws for example, is unknown and would require future study. Based on authors' analysis, time frames between original publication date and retraction date vary widely at the low end 2 years and at the high end 17 years with an average of 8.6 years from publication date to retraction date.

Social media may prolong the lifecycle of marred, hasty or subsequent misinterpretation of scientific data. It may also expand the reach of fake science and related conspiracy theories. The extent to which fake science may create real harm is of interest to law makers globally.

Part 2 United States Legal Landscape

Primarily due to the influence of the Free Speech clause of the First Amendment of the U.S. Constitution the legal options for regulating fake science or disinformation is limited if perhaps non-existent. In addition, Congress provided broad immunity for online service provider giving little legal incentive to control questionable but otherwise lawful content on platforms. In enacting 47 U.S.C. § 230 (Protection for private blocking and screening of offensive material) as part of the Telecommunications Act of 1996, Congress stated that "[i]t is the policy of the United States to preserve the vibrant and competitive free market that presently exists for the Internet and other interactive computer services, unfettered by Federal or State regulation." Under section 230 an online service is immune from civil liability for content other post on its platform or service. "No provider or user of an interactive computer service shall be treated as the publisher or speaker of any information provided by another information content provider." 47 U.S.C. § 230(b)(2). The definition of a service provider or "Interactive computer service" covers "any information service, system, or access software provider that provides or enables computer access by multiple users to a computer server, including specifically a service or system that provides access to the Internet and such systems operated or services offered by libraries or educational institutions." 47 U.S.C. § 230(f)(2). There is no immunity for content that infringes intellectual property. 47 U.S.C. § 230(e)(2) ("Nothing in this section shall be construed to limit or expand any law pertaining to intellectual property."). There are protections for service providers relating to copyright infringement, but those protections are found elsewhere. In order to secure the protection of the safe harbor a service provider must act "expeditiously to remove, or disable access to, the material that is claimed to be infringing or to be the subject of infringing activity" 17 U.S.C. § 512(c)(1)(C). However, section 230 contains no such requirement. As a result, there is no legal incentive to a service provider facing claims of other tort (injury) harms to undertake any remedial steps.

There are considerations to reform section 230 using several different strategies. One proposed Senate bill is the Online Freedom and Viewpoint Diversity Act. S. 4534, 116th Cong., 2d Sess., Online Freedom and Viewpoint Diversity Act (09/08/2020). This proposed bill would expand the range of blocking that can be done in subsection (c)(2) which currently reads: "No provider or user of an interactive computer service shall be held liable on account of (A) any action voluntarily taken in good faith to restrict access to or availability of material that the provider or user considers to be obscene, lewd, lascivious, filthy, excessively violent, harassing, or otherwise objectionable, whether or not such material is constitutionally protected." 47 U.S.C. § 230(c)(2)(A). It would accomplish this expansion by striking ''considers to be'' and inserting ''has an objectively reasonable belief is'' and adding to the list of content appropriately blocked to include ''promoting self-harm, promoting terrorism, or un lawful.'' Section 2 of proposed S. 4553. Hopefully, this change would encourage service providers to police their platforms for such content knowing that if harmed resulted from missed content the immunity would still apply. Section 2(1)(B)(i) of the proposed Online Freedom and Viewpoint Diversity Act would also amend the definition information content provider in current subsection (f)(3) of Section 230 which reads as follows: "The term 'information content provider' means any person or entity that is responsible, in whole or in part, for the creation or development of information provided through the Internet or any other interactive computer service." 47 U.S.C. § 230(f)(3). The proposed Online Freedom and Viewpoint Diversity Act would designate the current language of subsection (f)(3) into a new paragraph (f)(3)(A), then add a new paragraph (B): "(B) RESPONSIBILITY.—For purposes of subparagraph (A), being responsible in whole or in part for the creation or

development of information (i) includes any instance in which a person or entity editorializes or affirmatively and substantively modifies the content of another person or entity; and (ii) does not include a change to the format, layout, or basic appearance of the content of another person or entity.'' Section 2(2)(B) and (A) of the proposed Online Freedom and Viewpoint Diversity Act. If a service provider labeled content posted on its platform as suspect it would be immune from liability for making that designation. This too, might encourage service provider to more actively police the content it makes available.

Another Senate bill is the Platform Accountability Consumer Transparency (PACT) Act. The PACT Act would constitute an elaborate revision of current Section 230 by adopting a mechanism by which a user of an interactive computer service or a third party could provide "notice of illegal content or illegal activity on the inter active computer service that substantially complies with the requirements under [new] paragraph (3)(B)(ii)… 47 U.S.C. 230(c)…[if so] the provider shall remove the content or stop the activity within 24 hours of receiving that notice, subject to reasonable exceptions based on concerns about the legitimacy of the notice." S. 4066, 116th Cong., 2d Sess., Platform Accountability Consumer Transparency (PACT) Act, Section 6(a) (06/24/2020). The revised Section 230 under the PACT Act would resemble the take-down provisions in 17 U.S.C. § 512. The PACT Act defines illegal activity as "activity conducted by an information content provider that has been determined by a Federal or State court to violate Federal criminal or 18 civil law" and illegal content as "information provided by an information content provider that has been determined by a Federal or State court to violate Federal criminal or civil law or State defamation law." Section 6(b) of the proposed PACT Act, adding new subsection (f)(5) and (6).

On October 20, 2020 H.R. 8636, 116th Congress, 2d Session, Protecting Americans from Dangerous Algorithms Act was introduced. The bill is sponsored Representatives Malinowski and Eshoo. The bill was introduced in the wake of the militia instigated violence and shootings including two homicides in Kenosha, Wisconsin during a Black Lives Matter protest on the night of August 25, 2020. The militia communicated using Facebook. The bill amends Section 230 by removing immunity for a platform if its algorithm is used to amplify or recommend content directly relevant to a claim involving interference with civil rights (42 U.S.C. 1985); neglect to prevent interference with civil rights (42 U.S.C. 1986); and in cases involving acts of international terrorism (18 U.S.C. 2333) when "the claim involves a case in which the interactive computer service used an algorithm, model, or other computational process to rank, order, promote, recommend, amplify, or similarly alter the delivery or display of information (including any text, image, audio, or video post, page, group, account, or affiliation) provided to a user of the service if the information is directly relevant to the claim." Section 2, 2020 H.R. 8636, 116th Congress, 2d Session, Protecting Americans from Dangerous Algorithms Act, adding subsection (c)(3) to Section 230, entitled "Algorithmic Amplification." On September 23, 2020, Facebook as named as a party in a lawsuit regarding the wrongful death of one of the victims. A lawsuit is pending against Facebook. *Gittings, et al. v. Mathewson, et al.*, Civil Case No. 2:20-cv-1483 (E.D. Wis). "Social media is in Congress's cross hairs for its ability to spread content promoting conspiracy theories, propaganda and misinformation about the election and the COVID-19 pandemic. Companies including Facebook Inc. and Twitter Inc. rely on Section 230 to protect themselves from lawsuits relating to inflammatory material posted on their platforms." Henry Kenyon, Eshoo bill holds social media responsible for harm caused by algorithms Congressional Quarterly Roll Call, Data Privacy Briefing, no pagination in Westlaw (October 21, 2020).

The U.S. Supreme recently denied a Writ of Certiorari in *Enigma Software Group USA, LLC v. Malwarebytes, Inc.*, 946 F.3d 1040 (9th Cir. 2019). This would have provided the U.S. Supreme Court to review and possible limit the scope of the immunity provided in Section 230. *Enigma Software Group USA, LLC v. Malwarebytes, Inc.*, 946 F.3d 1040 (9th Cir. 2019), cert. denied 2020 WL 6037214 (October 13, 2020). Justice Thomas provided a memorandum opinion in denying certiorari. "Paring back the sweeping immunity courts have read into § 230 would not necessarily render defendants liable for online misconduct. It simply would give plaintiffs a chance to raise their claims in the first place. Plaintiffs still must prove the merits of their cases, and some claims will undoubtedly fail. Moreover, States and the Federal Government are free to update their liability laws to make them more appropriate for an Internet-driven society… Without the benefit of briefing on the merits, we need not decide today the correct interpretation of § 230. But in an appropriate case, it behooves us to do so." *Malwarebytes, Inc. v. Enigma Software Group USA, LLC*, 2020 WL 6037214, p. 4 (October 13, 2020). The provision of the statute in question in the cases was subsection (c)(2): "No provider or user of an interactive computer service shall be held liable on account of (A) any action voluntarily taken in good faith to restrict access to or availability of material that the provider or user considers to be obscene, lewd, lascivious, filthy, excessively violent, harassing, or otherwise objectionable, whether or not such material is constitutionally protected." 47 U.S.C. § 230(c)(2). The case involved two software companies. "Malwarebytes and Enigma have been direct competitors since 2008, the year of Malwarebytes's inception. In their first eight years as competitors, neither Enigma nor Malwarebytes flagged the other's software as threatening or unwanted. In late 2016, however, Malwarebytes revised its PUP-detection criteria to include any program that, according to Malwarebytes, users did not seem to like. After the revision, Malwarebytes's software immediately began flagging Enigma's most popular programs—RegHunter and SpyHunter—as PUPs. Thereafter, anytime a user with Malwarebytes's software tried to download those Enigma programs, the user was alerted of a security risk and, according to Enigma's complaint, the download was prohibited, *i.e.* Malwarebytes "quarantined" the programs." *Enigma Software Group USA, LLC v. Malwarebytes, Inc.*, 946 F.3d 1040, 1047-1048 (9th Cir. 2019), cert. denied 2020 WL 6037214 (October 13, 2020). The appellate court concluded that because the blocking was done for an ill-motive the immunity did not apply: "we hold that § 230 does not provide immunity for blocking a competitor's program for anticompetitive reasons, and because Enigma has specifically alleged that the blocking here was anticompetitive, Enigma's claims survive the motion to dismiss. We therefore reverse the dismissal of Enigma's state-law claims and we remand for further proceedings." *Enigma Software Group USA, LLC v. Malwarebytes, Inc.*, 946 F.3d 1040, 1052 (9th Cir. 2019), cert. denied 2020 WL 6037214 (October 13, 2020). In discussing the exception in Section 230 for intellectual property claims, the Ninth Circuit observed that "Enigma's Lanham Act claim derives from the statute's false advertising provision. Enigma alleges that Malwarebytes mischaracterized Enigma's most popular software programs in order to divert Enigma's customers to Malwarebytes. These allegations do not relate to or involve trademark rights or any other intellectual property rights. Thus, Enigma's false advertising claim is not a claim "pertaining to intellectual property law" within the meaning of § 230(e)(2). The district court correctly concluded that the intellectual property exception to immunity does not encompass Enigma's Lanham Act claim." *Enigma Software Group USA, LLC v. Malwarebytes, Inc.*, 946 F.3d 1040, 1053-1054 (9th Cir. 2019), cert. denied 2020 WL 6037214 (October 13, 2020).

Looking beyond Section 230, it is likely that a law designed to regulate or prohibit false information would meet with constitutional challenge. This has occurred. The Supreme Court invalidated the federal Stolen Valor Act of 2005 [18 U.S.C. § 704(b)], which criminalized falsely representing oneself as having been awarded military medals or decorations. As less restrictive means are available to achieve the Congress' goal of truth in military medal records the statute failed to pass the strict scrutiny test applied to content based restrictions on speech. "A Government-created database could list Congressional Medal of Honor recipients. Were a database accessible through the Internet, it would be easy to verify and expose false claims." *United States v. Alvarez*, 567 U.S. 709, 729 (2012). The Court reiterated its belief less speech in not better speech, i.e., the Marketplace of Ideas concept. "The lack of a causal link between the Government's stated interest and the Act… The Government has not shown, and cannot show, why counterspeech would not suffice to achieve its interest. The facts of this case indicate that the dynamics of free speech, of counterspeech, of refutation, can overcome the lie." Id. at 726. Justice Kennedy, writing for the plurality commented that the "respondent's statements anything but contemptible, his right to make those statements is protected by the Constitution's guarantee of freedom of speech and expression." Id. at 730.

It could be argued that some fake new, especially when the claimed purports to be based on science is so outrageous that legal harm is found. Such claim would be based on the tort theory of Intentional infliction of emotional distress (IIED): claims must be "so outrageous in character, and so extreme in degree, as to go beyond all possible bounds of decency, and to be regarded as atrocious, and utterly intolerable in a civilized community." *See* Restatement (Second) of Torts § 46 cmt. d (Am. Law Inst. 1965). The "actual malice" standard applicable to defamation cases was equally applicable to IIED claims brought by public figure. *Hustler Magazine, Inc. v. Falwell*, 485 U.S. 46 (1988). However, even here the influence of the Frist Amendment is present. In *Snyder v. Phelps*, 562 U.S. 443 (2011) a case involving the peaceful picketing of members of the military who were claimed to be homosexual. "Given that Westboro's speech was at a public place on a matter of public concern, that speech is entitled to "special protection" under the First Amendment. Such speech cannot be restricted simply because it is upsetting or arouses contempt" Id. at 458. Considering some disinformation surrounds co-called conspiracy theories the comment of Chief Justice Roberts is telling: "Because we find that the First Amendment bars Snyder from recovery for intentional infliction of emotional distress or intrusion upon seclusion—the alleged unlawful activity Westboro conspired to accomplish—we must likewise hold that Snyder cannot recover for civil conspiracy based on those torts." Id. at 460. Finally, the argument could be made that in some instances the disinformation is so pervasive that it creates a captive audience so the ability of the government to regulate would be greater. "As a general matter, we have applied the captive audience doctrine only sparingly to protect unwilling listeners from protected speech" Id. at 459. This *Snyder* Court also rejected this argument. Id.

As a result, the legal regulation of disinformation is near futile in the U.S. Voluntary, self-regulation by service providers is the only option. Likewise, in the European Union (EU), this is path chosen as most viable as well, coupled with nonintervention government strategies.

Part 3 European Legal Landscape

The approach to addressing the problems raised by fake news and fake science or disinformation, i.e., the term of preference in the European Union, is markedly different than the United States. In the EU, it is more common to have the private sector adopting a model of co-regulation and partnership with civil authority to combat a societal problem. In the EU, the 2017 and 2018 flurry of activity was designed in anticipation of the then upcoming European Parliament elections in May of 2019.

In 2017 a Joint Declaration on Freedom of Expression and "Fake News", Disinformation and Propaganda, adopted by Special Rapporteurs appointed by international organisations [sic] identified the major concerns with disinformation. As this content is designed to mislead it "interfere[s] with the public's right to know and the right of individuals to seek and receive, as well as to impart, information and ideas of all kinds, regardless of frontiers, protected under international legal guarantees of the rights to freedom of expression and to hold opinions." Joint Declaration on Freedom of Expression and "Fake News", Disinformation and Propaganda, adopted by Special Rapporteurs on Freedom of Expression and Access to Information, 1 (March 3, 2017), paraphrasing Article 11, European Union Charter of Fundamental Rights of the European Union and Article 19, Universal Declaration of Human Rights (10 Dec. 1948), U.N.G.A. Res. 217 A (III) (1948).

An initial scoping of strategies was presented in the Final report of the High Level Expert Group [HLEG] on Fake News and Online Disinformation: A Multi-Dimensional Approach to Disinformation (March 12, 2018). There are five "pillars" of action. Enhance the transparency of online news involving an adequate and privacy-compliant sharing of data about the systems that enable their circulation online, promote media and information literacy to counter disinformation and help users navigate the digital media environment, develop tools for empowering users and journalists to tackle disinformation fostering a positive engagement with fast-evolving information technologies, safeguard the diversity and sustainability of the European news media ecosystem, and promote continued research on the impact of disinformation in Europe to evaluate the measures taken by different actors and constantly adjust the necessary responses. Id. at 5-6 and 35. The first three rely on cooperation between the private and public sectors.

The HLEG focused its comments on disinformation, which it defined as "as false, inaccurate, or misleading information designed, presented and promoted to intentionally cause public harm or for profit." Id. at p. 10 It adopted the term "disinformation because "fake news" alone is "inadequate to capture" the complexity of the problem and because the term fake news is used by some politicians to "dismiss" or discredit information with which they disagree and so it "undermine[s] independent news media. Id. In a telling comment made is the context of the EU but so true of the climate in the U.S. the HLEG observed: "some problems of disinformation are animated by citizens individually or collectively sharing false and misleading content and that highly polarized societies with low levels of trust provide a fertile ground for the production and circulation of ideologically motivated disinformation." Id. at 11, citing, Weeks, B. E. (2015) Emotions, partisanship, and misperceptions: How anger and anxiety moderate the effect of partisan bias on susceptibility to political misinformation. Journal of Communication. 65 (4), 699-719. The best strategy includes multi-stakeholder collaborations with minimal regulation without "politically dictated privatization of the policing and censorship" of what is deemed unacceptable." Id. at 20. One strategy proposed is aimed at "'diluting' disinformation through increased transparency and

enhanced visibility and findability of trusted news content." Id. at p. 29. This comments echoes Justice Roberts opinion in the *Alvarez* decision. The answer to "bad" speech is more "good" speech so that the marketplace of idea decides. "Research suggests that detailed counter-messages and alternative narratives are often more effective than corrections in countering disinformation." Id. at p. 29, n. 50. This again is a direct parallel to the marketplace of ideas concept behind the Free Speech clause in the U.S. There is a clear concern by the HLEG to avoid governmental control of digital media. Id. at p. 30. As such, "the best responses are likely to be those driven by multi-stakeholder collaborations. Regulatory responses may quickly become inadequate to tackle a multi-faceted problem such as disinformation, whose nature and characteristics are bound to change fast with the evolution of technologies and digital behaviour [sic] patterns." Id. at 31.

The next month European Commission issues its essential framework regarding disinformation in the EU. European Commission Communication 'Tackling online disinformation': a European approach, COM(2018) 236 Final (April 26, 2018). Disinformation is "verifiably false or misleading information that is created, presented and disseminated for economic gain or to intentionally deceive the public, and may cause public harm. Public harm comprises threats to democratic political and policy-making processes as well as public goods such as the protection of EU citizens' health, the environment or security." Id.at pp. 3-4. It does not include "reporting errors, satire and parody, or clearly identified partisan news and commentary." Id.

The Communication identifies three causes for the rise in disinformation. "Economic insecurity, rising extremism and cultural shifts" offering a "breeding ground for disinformation." Id. at p. 4. The rise of platforms underscores a "media sector undergoing profound transformation." Id. Finally, "social networking technologies are manipulated to spread disinformation through a series of sequential steps: (i) creation; (ii) amplification through social and other online media; and (iii) dissemination by users." Id. at p. 5. Amplification occurs through algorithms designed to maximize the platform's busines model where advertising model is "click-based, which rewards sensational and viral content" along with bots that "artificially amplify the spread of disinformation." Id.
The Commission Communication highlight several harms from disinformation: the erosion of "trust in institutions and in digital and traditional media," a negative impact on "democracies by hampering the ability of citizens to take informed decisions…[and] supports radical and extremist ideas and activities. It impairs freedom of expression." Id. at 1. The obligation of the state is to "refrain from interference and censorship and to ensure a favourable [sic] environment for inclusive and pluralistic public debate." Id. Blame was targeted at online platforms logically as most disinformation originates, resides and is amplified in that environment. Further, regulation at this information funnel point is more efficient than addressing the individual perpetrators of the disinformation. "These platforms ["particularly social media, video-sharing services and search engines"] have so far failed to act proportionately, falling short of the challenge posed by disinformation and the manipulative use of platforms' infrastructures." Id. at 2. Some platforms have taken limited initiatives to redress the spread of online disinformation, but only in a small number of countries and leaving out many users. The Commission believes there should be several strategies: "improve transparency regarding the origin of the origin and the way it is produced, sponsored, disseminated and targeted…to reveal possible attempts to manipulate opinion…promote diversity of information, foster credibility of information by providing an indication of its trustworthiness [] with the help of trusted flaggers…improving traceability, fashion

inclusive solutions…awareness-raising, more media literacy, broad stakeholder involvement and the cooperation of public authorities, online platforms, advertisers, trusted flaggers, journalists and media groups. Id. at p. 6.

The Commission called for development of an EU-wide Code of Practice on Disinformation to which platforms and advertisers should commit. The Code would have numerous objectives:
Improving scrutiny of advertisement placements & restrict targeting options for political advertising, ensuring transparency about sponsored content, including political and issue-based advertising, closing down fake accounts, indicators of trustworthiness, improving findability of trustworthy content, clear marking systems and rules for bots, empower uses by facilitating content discovery & tools for reporting disinformation, ensuring safeguards-by-design against disinformation (e.g. algorithm prioritization), providing trusted fact-checking organisations and academia with access to platform data. European Commission Communication, 'Tackling online disinformation': a European approach, p. 7-8 (April 26, 2018). See also, EU Code of Practice on Disinformation, pp. 3-4 (September 26, 2018) (discussing same).

In May the Commission reported on the implementation of the Communication. European Commission Report, Implementation of the Communication "Tackling online disinformation: a European Approach" COM(2018) 794 final (May 5, 2018). The Report from the Commission reiterated its initial aims to develop "a self-regulatory code of practice on disinformation for online platforms and the advertising industry in order to increase transparency and better protect users; the creation of an independent European network of fact-checkers to establish common working methods, exchange best practices and achieve the broadest possible coverage across the EU; the promotion of voluntary online identification systems to improve the traceability and identification of suppliers of information; and the use of the EU research and innovation programme [sic] (Horizon 2020) to mobilise [sic] new technologies, such as artificial intelligence, block chain and cognitive algorithms." Id. at p.1. Commenting on the planned Code of Practice on Disinformation, the 15 "commitments" of the Code are organized into five fields: scrutiny of ad placements, political advertising and issue-based advertising, integrity of services, empowering consumers and empowering the research community." Id. The first two fields reflect the concern with the upcoming 2019 EU elections, The report concluded that "the actions outlined in the Communication have been accomplished or launched during 2018. Online platforms and the advertising industry have agreed on a Code of Practice to increase online transparency and protect consumers, with a particular view to the European elections in 2019. A network of fact checkers is being created that will strengthen capabilities to detect and debunk false narratives... Stakeholders should [] benefit from a number of research and innovation tools to identify and tackle disinformation… Awareness has increased across… sustained efforts, at EU and national level, to raise the level of media literacy and empower users, especially the younger generations, and improve critical thinking." Id. at 12.

The actual Code of Practice on Disinformation reiterated its purposes in the form of a series of "Commitments" in five areas: scrutiny of ad placements (transparency), political advertising and issue-based advertising (transparency), integrity of services (misuse of bots), empowering consumers (indicators of trustworthiness of content sources, media ownership and verified identity), and empowering the research community (platform data). European Commission, EU Code of Practice on Disinformation (September 26, 2018).

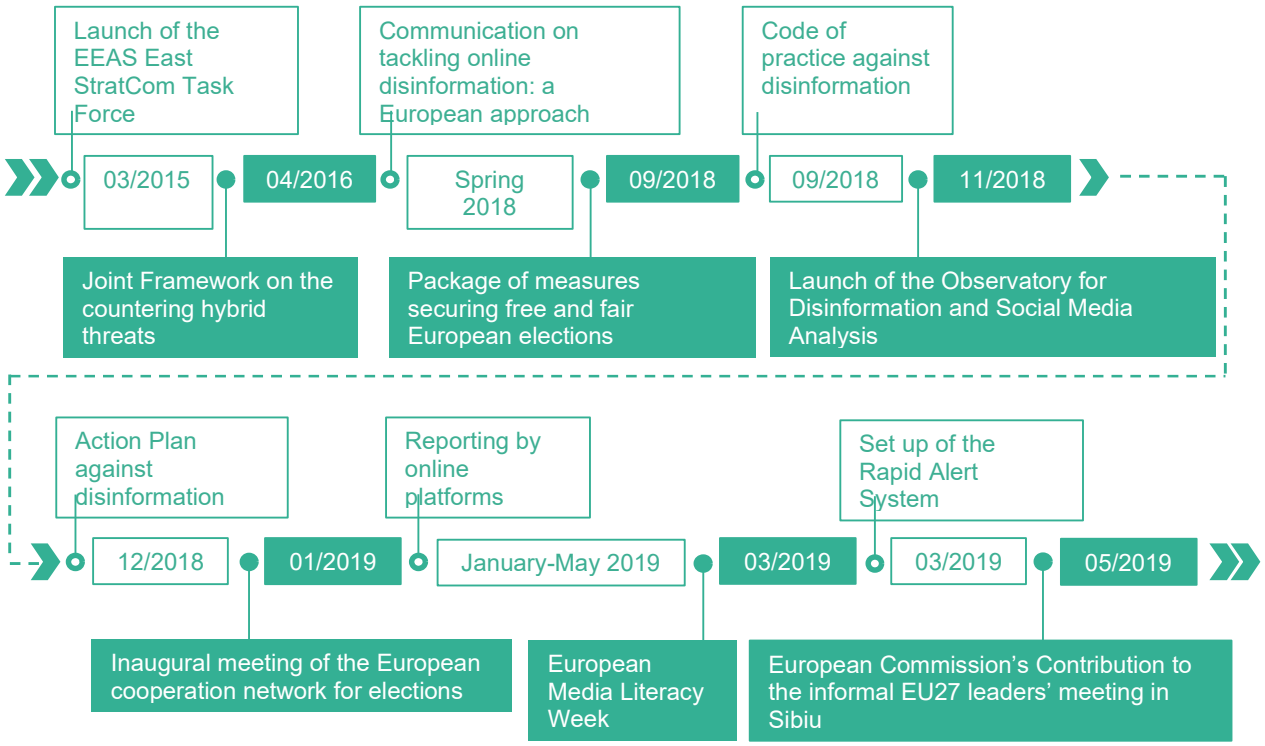
Motivated by upcoming "2019 European Parliament elections and more than 50 presidential, national or local/regional elections being held in Member States by 2020, it is urgent to step up efforts to secure free and fair democratic processes" the Commission issued its action plan in December of 2018. European Commission Joint Communication, Action Plan against Disinformation at p. 2 (JOIN(2018) 36 final (May 12, 2018), updated December 5, 2018. The Plan reiterated the harms of disinformation: "Disinformation undermines the trust of citizens in democracy and democratic institutions. Disinformation also contributes to the polarisation [sic] of public views and interferes in the democratic decision-making processes." Id. at 11. The Plan stressed the key role "played by civil society and the private sector (notably social media platforms) in tackling the problem of disinformation." Id. The Plan identified four pillars: improving the capabilities of Union institutions to detect, analyse [sic] and expose disinformation, strengthening coordinated and joint responses to disinformation, mobilising [sic] private sector to tackle disinformation and raising awareness and improving societal resilience. Id. at pp. 5-11. One of the coordinated and joint responses is the establishment of a Rapid Alert System "to provide alerts on disinformation campaigns in real-time." Id. at p.7. This is one tool that can "foster an open, democratic debate free from manipulation, including in the context of the forthcoming European elections." Id. Cooperation of the private sector is crucial to success: "Online platforms, advertisers and the advertising industry have a crucial role to play in tackling the disinformation problem, as its scale is directly related to the platforms' ability to amplify, target and spread disinformation messages of malicious actors." Id. at p. 8. The Action Plan observed the past failures of the private sector to "act appropriately to tackle the problem." Id. A key concept in all the Commission communication, plans, etc. is to increase what it phrases as "societal resilience." This reflects a view that most effective strategies meet the problem of disinformation from the bottom up. Id. at p. 9. This is accomplished through numerous strategies to increase media, information and data literacy: "the objective is for the Union and its neighbourhood [sic] to become more resilient against disinformation. This requires continuous and sustained efforts to support education and media literacy, journalism, fact-checkers, researchers, and the civil society as a whole." Id. at p. 12.

In June of 2019, the Commission issued a Report in the aftermath of Parliamentary elections.

European Commission Joint Communication, Report on the Implementation of the Action Plan against Disinformation JOIN(2019) 12 Final (June 14, 2019). "The aim of disinformation is to distract and divide, to plant seeds of doubt by distorting and falsifying facts, thus confusing people and weakening their faith in institutions and established political processes." Id. at 1, n. 1. To this end the Report observed that "available evidence has not allowed [sic] to identify a distinct cross-border disinformation campaign from external sources specifically targeting the European elections. However, the evidence collected revealed a continued and sustained disinformation activity by Russian sources aiming to suppress turnout and influence voter preferences... a consistent trend of malicious actors using disinformation to promote extreme views and polarise local debates, including through unfounded attacks on the EU." Id. at p. 3 (footnote emitted). As online platform data was not made available in sufficient and significant quantities "a conclusive assessment of the scope and impact of disinformation campaigns will take time and require a concerted effort by civil society, academia, public actors and online platforms." Id. at p.3.

The Report indicated that online platforms have taken measures to increase the integrity of services each offers. For example, from January to May leading up to the elections "Google reported to have globally removed more than 3.39 million Youtube channels and 8,600 channels for violations against its spam and impersonation policies. Facebook disabled 2.19 billion fake accounts in the first quarter of 2019 and acted specifically against 1,574 non-EU-based and 168 EU-based pages, groups and accounts engaged in inauthentic behaviour targeting EU Member States. Twitter challenged almost 77 million spam-like or fake accounts globally." Id. at p. 4, n. 11. In addition, the European Media Literacy Week included over 320 events in the EU during the week of March 18, 2019.

Overview of EU joint and coordinated action against disinformation



Source: European Commission Joint Communication, Report on the Implementation of the Action Plan against Disinformation JOIN(2019) 12 Final at p. 2 (June 14, 2019).

The report concluded that "preliminary analysis shows that it contributed to expose disinformation attempts and to preserve the integrity of the elections, while protecting freedom of expression. The highest turnout in the past twenty years (50.97 %) reflects the interest of the citizens for the Union and its importance for their lives." Id. at p. 9 (footnote eomitted). While disinforation is an evovling threat requiring "continuous research to update our policy toolboox… the objective remains the same: dividing our society and undermining the trust of citizens in democratic processes and institutions." Id.

A year later the detailed European Commission, Study for the "Assessment of the Implementation of the Code of Practice on Disinformation" Final Report (May 2020) was released. Commenting on the effectiveness of the "five pillars" the Final Reports made the following observations. Regarding the scrutiny of ad placements: "The Code has not effectively incentivised [sic] the platforms to provide data that is detailed enough to be of use in assessing the effectiveness of their existing policies with regards to scrutiny of

ad placements." Id. at p. 39. There should also be "clearer definitions" and "[m]inimum data reporting requirements" for the platforms. Id. at pp. 39 and 40, respectively. As the impetus for the Commission's work in the area was the 2019 European elections the Final Report concluded that stakeholders felt "that the Code, as it stands, places a disproportionate emphasis on political or issue-based advertising and should be updated to recognise [sic] that disinformation is also highly prevalent in terms of "organic" content by individual users, not just via advertising." Id. at p. 44 (regarding the second pillar: political and issue-based advertising). The stakeholders consulted also believed that there is still a "lack of data regarding this pillar that would allow independent verification of the information provided by the platforms." Id. at 46. Though platforms have oools and policies in place, "the focus is predominantly on preventing the creation of fake accounts/users and on detecting and deleting them. The status of such accounts/users (active, dormant, inactive etc.) and the reach of their activities is less known and reported on." Id. at p. 49.

Regarding the empowerment of consumers, the signatory platforms have developed a variety of tools: "Facebook has a context button which appears alongside links shared on its News Feeds…
Google has features such as Breaking News and Top News to ensure the prominence of authoritative content…Twitter has the 'verified accounts' function which means that celebrities, journalists, news organisations [sic] and politicians have verified accounts on Twitter (signalled [sic] by a blue badge with a white 'v' next to their name)… Mozilla included… a rollout of enhanced security features in the default setting of Firefox which highlights the quality of websites and provides other information about the website relevant to empower consumers…
Microsoft has a partnership with NewsGuard, which reviews online news sites across a series of nine journalistic integrity criteria." Id. at pp. 51 and 52 (footnotes omitted). The Final Report noted that these efforts "should be further developed and more widely implemented. This can then act as a minimum standard for all platforms to live up to further down the line… However, this does not automatically lead to consumer empowerment as the possibilities for this are not always know, and sometimes not even desired, by the (majority of the) consumers." Id. at 54.

The Final Report recounted a number of initiatives and collaboration the platforms are undertaking to support research on disinformation: "Twitter for example disclosed a significant archive of state-backed information operations on Twitter in October 2018… Mozilla Foundation which launched joint campaigns on transparency involving 71 researchers and 37 civil society organisations.102 Facebook reported that in April 2018 it launched a partnership with Social Science One (SS1), a group of 83 academic researchers, to share data with the academic research community while maintaining stringent privacy protections…. Microsoft also implemented partnering programmes [sic] with researchers (TAP), research institutions (Princeton University, Oxford Internet Institute) and with industry, including the participation of Bing News in the Trust Project… In collaboration with the International Fact Checking Network, Google News Lab launched FactCheck EU in March 2019 to provide fact checks from 19 organizations from 10 countries in 11 languages… Google also introduced new tools for researchers and the fact checking community: a ' Fact Check Explorer', which allows for exploration of Fact Checking journalism, and the 'Fact Check Markup Tool', which allows fact checkers to easily mark their own articles as fact-checks'" Id. at 55-56 (footnotes omitted). However, the Final Report noted that of the five pillars this is least developed. Id. at 56. Both the platforms and the research community criticized the other.

"Researchers noted that there is limited engagement with the research community and that the tools set up by platforms are still too weak, not transparent enough and not really user friendly…According to platforms, the requests from researchers may sometimes be unclear or unrealistic, which makes the collaboration more difficult." pp. at 59-60.

The Final Report also noted at the member state level several countries have launched awareness and literacy campaigns, often in conjunction with trusted source or fact-checker portal. Fewer countries have actual legislative measures in place do the controversy that restrictive measures could "jeopardise [sic] democracy and censor the press." Id. at p. 78. Both France and Lithuania have measures that allow television channels to block disinformation (France: block television channels where "false information likely to affect the sincerity of the ballot" and Lithuania: television and radio stations blocking of "disinformation and information which is slanderous and offensive to a person or degrades human dignity and honour [sic]." Id. at pp. 78 and 79 (footnotes omitted). Initiatives in other member states including Hungary, Ireland and Italy have been discussed, or proposed or pending or recently enacted. Another approach taken in the Czech Republic is to target cyber-security and terrorist threats. Id. at pp. 80-81. Such measures would be broad enough to include disinformation if that was the form or context of the threat.

The most recent law is the European Commission Communication: the EU's fight against COVID-19 Disinformation released on June 10, 2020. As might be figured given the times in which we live the topic was scientific and medical disinformation related to COVID-19. The Communication addressed the issue of global "infodemic" and "flood of information about the virus, often false or inaccurate and spread quickly over social media." European Commission Joint Communication, Tackling COVID-19 Disinformation - Getting the Facts Right, JOIN/2020/8 Final, p. 1 (June 10, 2020). The Communication pointed to various forms of disinformation including "dangerous hoaxes and misleading healthcare information" conspiracy theories, hate speech regarding ethnic or religious group responsible for spread of the virus, consumer fraud (e.g., selling "miracle" cures), cybercrime (e.g., hacking/phishing using COVID-19 links), foreign actors (Russia and China are named in specific) influencing operation and disinformation campaign. Id. at p. 3. As with previous EU Commission communications there is an emphasis on platform cooperation (pp. 8-9) especially in supporting the work of fact-checkers and researchers (pp. 9-10) and the role of a free and independent media in reporting and outing sources of disinformation related to COVID-19 (pp. 10-13).

Overall, the EU is ahead of the US in identifying and defining disinformation, in raising awareness regarding its incidence and effects and in constructing collaborative multi-pronged plans and approaches for countering disinformation.

Part 4 Comparisons of the United States and European Legal Landscapes

Both the US and EU value freedom of expression, thus the EU has not a adopted a regulatory model but focused on cooperation between the private and public sector. In the US, due the First Amendment concerns the approach should be the same. Thus both the US and EU have the path of self-regulation and private/public collaboration as a framework to respond to the problem of disinformation. However, the policy attitudes in the US regarding the regulation of the private sector regarding information in general leave the US unprepared to mobilize the widespread and inclusive alliances necessary with private sector and civil society stakeholders. This is not to claim it is not occurring in the US especially in light of 2020 elections and its aftermath and the continuing

pandemic, but it is not coordinated nor is there a unified federal plan or response. Rather platform and provider responses remain reactive, inconsistent and intermittent.

Part 5 Prevention & Deterrence

The practice of retracting fabricated data and results and leveraging legal remedies to help reduce the spread of fake science through social media comes late in the game. There are opportunities at earlier points along the continuum including prevention and deterrence of publishing fabricated or false research and results.

The United States Federal Government provides tremendous amounts of research funding and has a vested interested in preventing research misconduct where ever it has granted out monies. Within the Department of Health and Human Services, it has established an Office of Research Integrity [ORI]. The ORI is focused on ensuring the integrity of the research itself and disciplines those who do not adhere to standards.

Specifically, the ORI oversees and directs Public Health Service [PHS] research integrity on behalf of the Secretary of Health and Human Services. Per the ORI website, "*PHS provides nearly $38 billion for health research and development, primarily in the biomedical and behavioral sciences, through its extramural and intramural programs. Extramural funding supports research institutions outside of tthe federal government including medical shools, universities, hospitals and other reserch organizations with intramural funding supporting federal government agencies.* The ORI "*is responsible for ensuring the integrity of this research."* Operationally this translates to detection, investigation, and enforcement. The ORI also provides technical assistance to institutions and offers programming designed to promulgate responsible conduct. The agency is also empowered to discipline scientists who have committed research misconduct. (Office of Research Integrity, n.d.)

The ORI publishes research misconduct case summaries which include any imposed restrictions or sanctions against respondents. Once restrictions are lifted, the case summary is removed from the list. However, these actions are also recorded permanently in the Federal Registry. Six case summaries have been posted in 2020 as of September of that year. The publication date reflects the year in which investigations were completed. Respondents voluntarily enter into disciplinary agreements with the ORI; however, the agreements are not necessarily an admission of wrong doing. Authors' observations on 2020 investigations.

- Research misconduct is not concentrated in any particular discipline or setting.
- Fabricated and/or falsified data and results have been published in both grey literature and scholarly journals.
    - Typically most, if not all, of the Respondent's journal articles are rectracted; in some instances a correction is found to be sufficient
- Other misconduct such as plagiarism may have also occurred.
- A number of consequences negatively effect both the respondent and the institution.
    - A 2-3 panel committee must supervise the Respondent's research for a period of time. For the 2020 cases, the least amount of supervised time was 2 years and at the most 4 years except in the case of voluntary exclusion.
    - The committee must provide a report to the ORI certifying the research conducted by the Respondent meets standards.
    - The Respondent may be unable to fulfill hiis or her research obligations to the institution because he or she may not supervise, advise, and/or otherwise participate in grant funded research during the supervised period.

- Some respondent's voluntarily exclude themselves from government or sub government contracts for 10 years.
- In one cases,the Respondents's doctoral degree was revoked by the granting institution.

These consequences are career damaging if not career ending for the Respondent, but also put the institution in a difficult situation because many programs are heavily dependent on grant monies.

Part 6 Recommendations

Finding a path to reducing the spread of fake science is elusive and solutions have limitations. Culturally, socially, and emotionally, we humans like to have answers that resonate with our values, our hopes that calm our fears. People turn to conspiracies when there is an insufficient explanation. All of which is not to say that we should not intervene where possible to curtail the distribution of disinformation/misinformation at various points--teaching even the youngest of students to think critically, improving science literacy in government and amongst the public, retracting problematic studies and as a final recourse, imposing legal remedies.

Moving the needle will require a multifaceted strategy such as the five action-oriented pillars recommended in Fake News and Online Disinformation: A Multi-Dimensional Approach to Disinformation introduced in Part 3. The approach calls for among other things:

- Transparency around how online news is circulated
- Promotion of media and information literacy as a countermeasure and to help users navigate digital media
- Development of tools that would empower both users and journalist to tackle misinformation
- Fostering positive engagement in the rapid evolution of information technologies
- Finding ways to safeguard and sustain diversity in journalism and continued research

Multidimensional strategies require effort on the part of the social media industry, the journalism industry, education at all levels, and for users to take responsibilities for what they post and share.

Consider Andorfer's suggestion on three potential approaches including legal remedies already discussed herein. The other two are human judgement and purely technological solutions.

Human judgement places at least some responsibility on social media users and platform providers to identify and report posts that are dubious. In addition, encouraging users to moderate their own behaviors around sharing and reposting. (Andorfer, 2018, pp. 1413) There are several third party vendors that avail themselves to social media users who are willing to factcheck including the well known website, Snopes.com. At the platform level, Facebook for example has developed a flagging system wherein users can report problematic posts, which the company turns over to third parties to verify the accuracy of the information. (Andorfer, 2018, pp. 1414)

Facebook's human judgement solutions and others like it are imperfect. Among other things, it is increasingly difficult for even the savviest users, to identify fake news, especially deep fakes. Other issues include human error and bias.

Pure technological solutions utilizing artificial intelligence are also possible as these are increasingly sophisticated and capable of analyzing speech. Here too though there is the issue of bias and we may see the attitudes of corporations reflected, although not intentionally which could lead to censoring by social media companies like Facebook, Twitter and others.

Fake science has its own unique contributing factors stemming from the replication crisis, the limitations of the peer review process, the time it takes to discover falsification and fabrication, and long delays in retractions providing opportunity for misapplication and conspiracies to arise. These require multidimensional solutions to reduce systemic issues and to better communicate results to the general public.

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Grey Literature is a Necessary Facet in a Critical Approach to Gambling Research

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Abstract

Commercial gambling has seen massive global expansion in the past 25 years. It is a huge industry selling a risky form of entertainment: problem gambling is the only non-substance addiction recognized in the DSM-5, affecting an average of 2.3% of people in jurisdictions where prevalence data are available. Gambling also harms people who gamble below the clinical threshold of "problem gambling", as well as the friends, families and communities of people who gamble. Gambling harm is disproportionally felt by racialized peoples and people of lower socioeconomic status. As such, researchers and governments are increasingly viewing gambling as a public health issue.

Gambling research is published in both the primary and grey literature, and the integrity of gambling research is a topic of increasingly heated debate. Bibliometric reviews have found that gambling research is heavily focused on the psychological and biological characteristics of people with problem gambling, with less emphasis on the gambling products themselves and how they are provided. While the gambling grey literature is recognized as valuable by the gambling research community, it has not yet been systematically assessed.

In this paper we present the grey literature analysis portion of a pilot project to use a big data approach to produce a mapping review of gambling research from five nations: Australia, Canada, New Zealand, United Kingdom, and United States. For primary research publications on gambling, we performed systematized searches on the Scopus and Web of Science databases. For gambling grey literature, we retrieved all grey literature documents in the GREO International Gambling Research Evidence Centre. For the period of 2014-2018, the grey literature search yielded 360 reports, compared to 1292 articles in the primary literature search. The proportion of grey literature greatly varied by country, ranging from <10% in USA to nearly 50% in New Zealand. Content analysis revealed that the problems investigated in gambling grey literature are very different from the published literature: the top problems in the published literature were young gamblers and online gambling, whereas the top problems in the grey literature were the prevalence of problem gambling and the health and well-being of the public. This demonstrates that the grey literature is a vital piece of the puzzle to understanding this public health issue.

Background

Gambling as a public health issue

Commercial gambling is expanding in many countries, and is increasingly viewed as a public health issue (Korn & Shaffer, 1999; Wardle, Reith, Langham, & Rogers, 2019). Although global gambling revenues are difficult to accurately measure, a 2015 report estimated the global gambling market to be worth US$423 billion, and would grow to US$635 billion by 2022 (Morgan Stanley 2015, as cited in Cassidy, 2020). Commercial gambling has been called a “dangerous commodity” similar to tobacco or alcohol, and presents addiction issues and other social harms that are disproportionately borne by vulnerable populations (Markham & Young, 2015). Currently, problem gambling is the

only non-substance addiction recognized by the American Psychiatric Association's classification of mental disorders, and one of only two recognized by the WHO's International Classification of Diseases (American Psychiatric Association, 2013; World Health Organization, 2018). Problem gambling prevalence rates average 2.3% worldwide in countries where data are available (Williams, Volberg, & Stevens, 2012). Problem gambling is more prevalent in poor and racialized communities (Abbott, Volberg, Bellringer, & Reith, 2004), and in North America is most prevalent in Indigenous populations (Williams, Stevens, & Nixon, 2011).

Many others are harmed by gambling besides those with problem gambling: on average, one person's problem gambling negatively impacts six others who are close to them (Goodwin, Browne, Rockloff, & Rose, 2017), and there are many more people who gamble and experience a low or moderate amount of gambling-related harm, but do not reach the threshold for a clinical diagnosis of problem gambling (Browne et al., 2016).

Why a critical approach to gambling research?

When governments legalize or expand gambling, they often simultaneously create gambling research and treatment programmes which are funded from a levy based on a percentage of gambling revenues (GREO, 2020). Although there are multiple potential conflicts of interest with doing research funded by directly by the gambling industry (Kim, Dobson, & Hodgins, 2016), there are also concerns when research is funded indirectly from gambling revenues via a levy. In this model, the research funding body and the researchers themselves both necessarily benefit from gambling revenues growing/remaining high (Adams & Rossen, 2012), which may discourage research that challenges the status quo of gambling operation (Livingstone et al., 2018).

There have been a small number of empirical investigations into these issues. The 2013 "Fair Game" report interviewed 109 gambling researcher stakeholders and found that when gambling research funds were mediated through specialized agencies the researchers were pressured to research politically "safe" topics such as problem gambling instead of broader issues about how gambling is provided (Cassidy, Loussouarn, & Pisac, 2013). This narrow focus on psychological and psychiatric perspectives on individual people with problem gambling was replicated in two bibliometric mapping reviews of thousands of gambling research articles, (Akçayir, Nicoll, Baxter, & Palmer, Forthcoming 2021; Baxter, Hilbrecht, & Wheaton, 2019). Only two quantitative empirical reviews of gambling research have specifically investigated the effect of gambling industry funding on research bias. These studies found no significant differences between industry and non-industry funded research, but these studies were themselves directly funded by the gambling industry and their findings should be treated with caution (Ladouceur, Shaffer, Blaszczynski, & Shaffer, 2019; Shaffer et al., 2019).

Gambling's grey literature

The above empirical reviews all share a significant limitation: they only review research published in journal articles and exclude the significant body of gambling research published as grey literature. Many of the aforementioned government-funded gambling research programmes primarily publish research reports as grey literature. For example, the Ontario Problem Gambling Research Centre (OPGRC), funded by the Government of Ontario, operated from 2000 to 2013 and was the largest single funder of gambling research at the time, awarding an average of CAD$2.23 million per year; some OPGRC studies were published as academic journal articles but all research was also published as peer-reviewed grey reports (OPGRC, 2013). Many other types of organizations publish

gambling research as grey literature, including non-governmental organizations, think tanks, and gambling industry trade organizations (GREO, n.d.).

Despite the wealth of grey literature evidence on gambling topics, it has not been considered in debates about the conduct on gambling research, and it is often not included in knowledge syntheses on gambling topics. It is an established best practice to include grey literature in health research knowledge syntheses such as systematic reviews (Hopewell, McDonald, Clarke, & Egger, 2007), because grey documents often cover different topics and are more in-depth than their traditional counterparts, and can be less subject to publication bias toward statistically significant results, amongst other potential benefits (Bonato, 2018). Although guidelines have been developed for systematically searching public health grey literature (Godin, Stapleton, Kirkpatrick, Hanning, & Leatherdale, 2015), a recent high-profile systematic review on gambling interventions excluded grey literature by claiming that it is called 'grey' because it is not peer-reviewed and therefore of questionable scientific robustness and reliability (Ladouceur, Shaffer, Blaszczynski, & Shaffer, 2017). We argue that, on the contrary, grey literature can be of equal or greater scientific rigour than a peer-reviewed journal article. This is because the accepted definition of "grey literature" is concerned with document formats, publishing bodies, method of publication, and meeting a *minimum* level of quality. (Schöpfel, 2010). In contrast, peer-reviewed articles can fall short on several quality indices, as recent debates about the reliability and replicability of experiments, data collection and analyses of important and influential publications attest.(Baker, 2016; Heathers, 2020; Jackson, 2020)

In order to address this significant gap in gambling research debates, this study presents a pilot study which we believe is the first investigation of the qualities of gambling's grey literature research publications in comparison to the primary literature on gambling. We aim to map the recent primary and grey literature on gambling in five countries: Australia, Canada, New Zealand, the United Kingdom, and the United States. These five countries were selected because they share similar recent histories of gambling liberalization, and their academic and grey documents are primarily published in English. We address the following research questions:

1. What proportion of gambling research is published as grey literature in the five study countries?
2. What issues are most often investigated in gambling research? Do the issues differ between primary and grey research publications?
3. Which academic disciplines study gambling? Do disciplines differ between primary and grey research publications?

Methods

The present study employs a mapping review methodology. A mapping review is a type of knowledge synthesis that aims to describe and categorize information within a body of knowledge of known scope (Grant & Booth, 2009).

Literature Search and Inclusion/Exclusion Criteria

The primary literature searches were performed on the Scopus and Web of Science databases, which are the two largest multidisciplinary indexes of peer-reviewed journal articles. The search methods and inclusion/exclusion criteria for producing this dataset are described elsewhere (Akçayir, Nicoll, Baxter, & Palmer, 2021), but in summary a broad keyword search for "gambl*" was used to maximize recall of relevant articles. Inclusion criteria required articles to be empirical studies published in academic journals

between 2014-2018, where gambling is the central topic of investigation and the first author is from one of the five target countries.

The grey literature sample was retrieved from the Gambling Research Exchange (GREO) International Gambling Research Evidence Centre. The GREO Evidence Centre's collection policy is international in scope and prioritizes grey literature (Baxter & Hilbrecht, 2020), and it's grey literature collection is strongest in the five countries of this study. Guided by Adams et al.'s framework of evaluating grey literature tiers based on source expertise and outlet control (Adams, Smart, & Huff, 2017), our search was limited to the document type categories "White Papers" and "Reports", with the exclusion of Reports subtypes that are not research documents (i.e., Legislation, Annual Report, Policy Document). As the scope of the GREO Evidence Centre is gambling only, no keyword limits were imposed on the search results. Similar to the primary literature search, results were limited to the time period of 2014-2018, and required to be published by an organization or government from one of the five target countries. All searches were conducted in 2019 with the last search performed on 7 August 2019.

Data Coding and Analysis

All primary articles and grey reports were coded for descriptive information to ascertain year of publication and study location. For primary literature, the location was assigned to the country of the first author listed on the study. For grey literature, location was assigned based on the location of the publisher/producing body.

To identify and code the main "issues" investigated in each study, an inductive content analysis was performed, following the methodology of Akçayir and Akçayir (2017). For each study, the abstract, keywords, and background/introduction sections were read to find purpose statements and research questions identifying the issue of investigation. This information from each study was input into the qualitative data analysis program Atlas.ti 7 and coded. The coded issues were then grouped into categories based on their similarities and assigned to the most descriptive wording that was used.

For disciplinary analysis, primary literature was assigned a discipline based on the self-description of the journal in which the article is published. For grey literature, as the publications do not have a disciplinary journal, documents were assigned a discipline based on the affiliation of the first author of the document, if such information is available.

Results

The primary literature dataset included 1292 empirical journal articles, while the grey literature search resulted in 360 reports, primarily from national and subnational government sources. A summary of the distribution of primary and grey documents by country is summarized in Table 1.

Table 1: distribution and proportion of primary and grey literature publications, 2014-2018.

Country	Primary Literature	Grey Literature	% Grey Literature
Australia	325	80	19.8%
Canada	307	156	33.7%
New Zealand	32	31	49.2%
United Kingdom	198	48	19.5%
United States	430	45	9.5%
Total	**1292**	**360**	**21.8%**

The proportion of gambling research publications that were grey literature varied considerably between countries, ranging from under 10% in the United States to nearly 50% in New Zealand. This suggests that the different countries in the study may have different publication norms for gambling research, or broader research generally.

Top "Issues" of Investigation

Our content analysis revealed many issues that are studied in gambling research, but for the purposes of this analysis only the top ten issues for each literature type are presented. These results are presented in Table 2.

Table 2: The top ten issues investigated in primary and grey literature research publications on gambling, 2014-2018.

Primary Literature (N=1292)			**Grey Literature (N=360)**		
Issue	**n**	**% of Total**	**Issue**	**n**	**% of Total**
Young adult gamblers	111	8.59%	Health problem/well-being	31	8.61%
Online gambling	110	8.51%	Prevalence	30	8.33%
Slot machines/EGMs	86	6.66%	Slot machines/EGMs	24	6.67%
Children & Adolescents	60	4.64%	Responsible gambling	20	5.56%
Treatment	56	4.33%	Treatment	20	5.56%
Advertising	47	3.64%	Online gambling	17	4.72%
Characteristics	47	3.64%	Sports betting	17	4.72%
Gambling motivations	46	3.56%	Gambling harms	15	4.17%
Sports betting	45	3.48%	Harm minimization	15	4.17%
Impulsivity	43	3.33%	Assessment	12	3.33%

The content analysis reveals some similarities, as well as some important differences. In both samples we see an interest in the same specific forms of gambling (i.e., "Online gambling", "Slot machines/EGMs", and "Sports Betting") as well treatment for problem gambling.

The popular issues unique to the primary literature include interest in certain types of individuals gambling (i.e., "Young adult gamblers", "Children & Adolescents") and what about them makes them gamble (i.e., "Characteristics", "Gambling Motivations", and "Impulsivity"), as well as the effects of advertising. These results largely replicate the heavy emphasis on the psychology of individual gamblers found in previous mapping reviews of gambling research.

In the grey literature sample, we see more interest in the whole population (i.e., "Prevalence" and "Assessment") and concern for gambling being harmful (i.e., "Health problem/well-being", "Gambling harms", and "Harm minimization"). Finally, we also see the theme "Responsible gambling".

The concept of responsible gambling is based on the "Reno Model of Responsible Gambling" (Blaszczynski, Ladouceur, & Shaffer, 2004), which has guided much of gambling policy development in the five study countries since its publication in 2004. The Reno Model referred to all gambling stakeholders, including governments, gambling providers, health services, and community and consumer groups share the responsibility of creating gambling policies that minimize gambling-related harms, however it has been criticized more recently as having evolved to shift the responsibility of gambling harms onto individual gamblers who don't "gamble responsibly" (Hancock & Smith, 2017). Indeed, a recent scoping review on responsible gambling found that by far the most predominant theme was "responsible gambling tools and interventions", such as a

pop-up message on a slot machine suggesting you take a break, or the ability to ban oneself from the casino (Reynolds, Kairouz, Ilacqua, & French, 2020). These types of gambling harm minimization measures focus the responsibility of preventing gambling harm on the person doing the gambling, not on the gambling provider.

Disciplines studying gambling

The results for disciplinary approaches of gambling research are presented in Figure 1 (primary literature) and Figure 2 (grey literature). The data must be compared with caution as they were collected differently, and each have their own limitations. each primary literature journal article was automatically assigned the self-described discipline of the journal in which it was published. The issue is that many journals describe themselves as "interdisciplinary" although the individual articles published within the journal are usually within a single discipline. As a result, nearly one-quarter of articles were assigned to the uninformative category "Interdisciplinary". Conversely, although the grey literature documents were assigned a discipline based on the first author's professional or academic department affiliation, over one-third of items either had an institutional author or the first author's discipline could not be ascertained and were therefore coded as "Not Applicable".

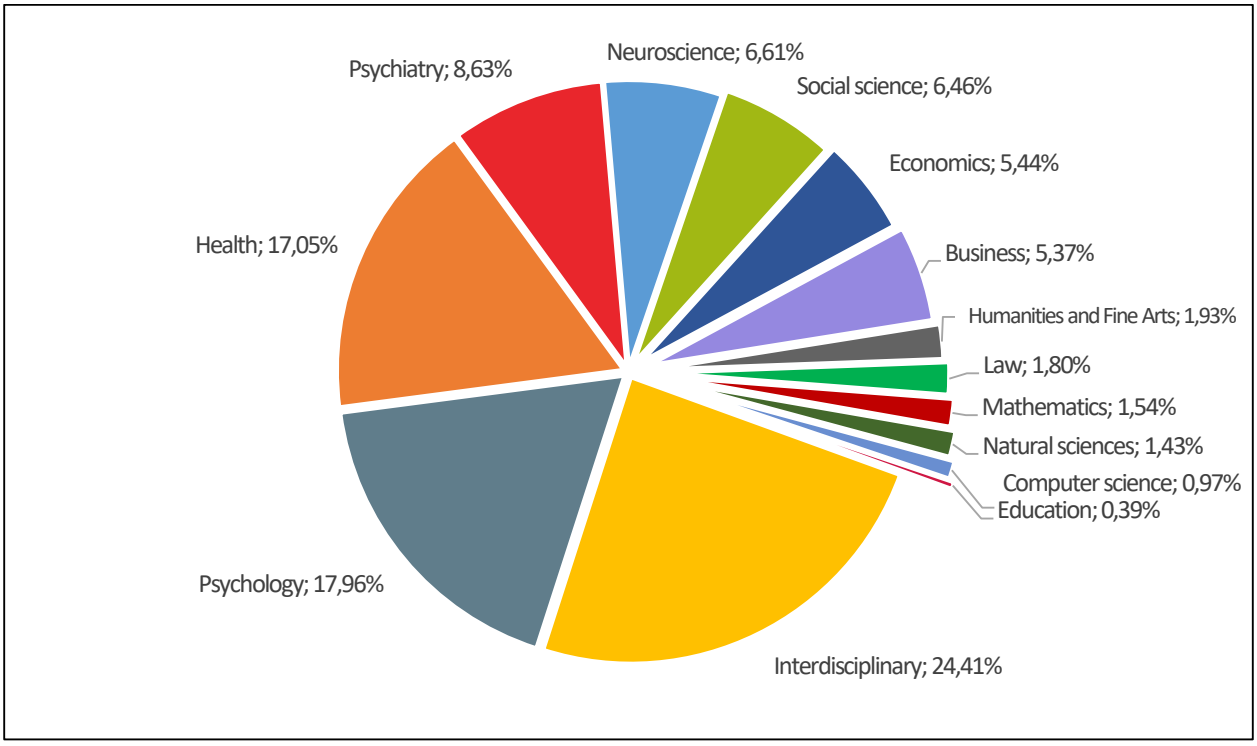

Figure 1: Academic disciplines of primary literature research publications on gambling, according to journal self-description (N=1292)

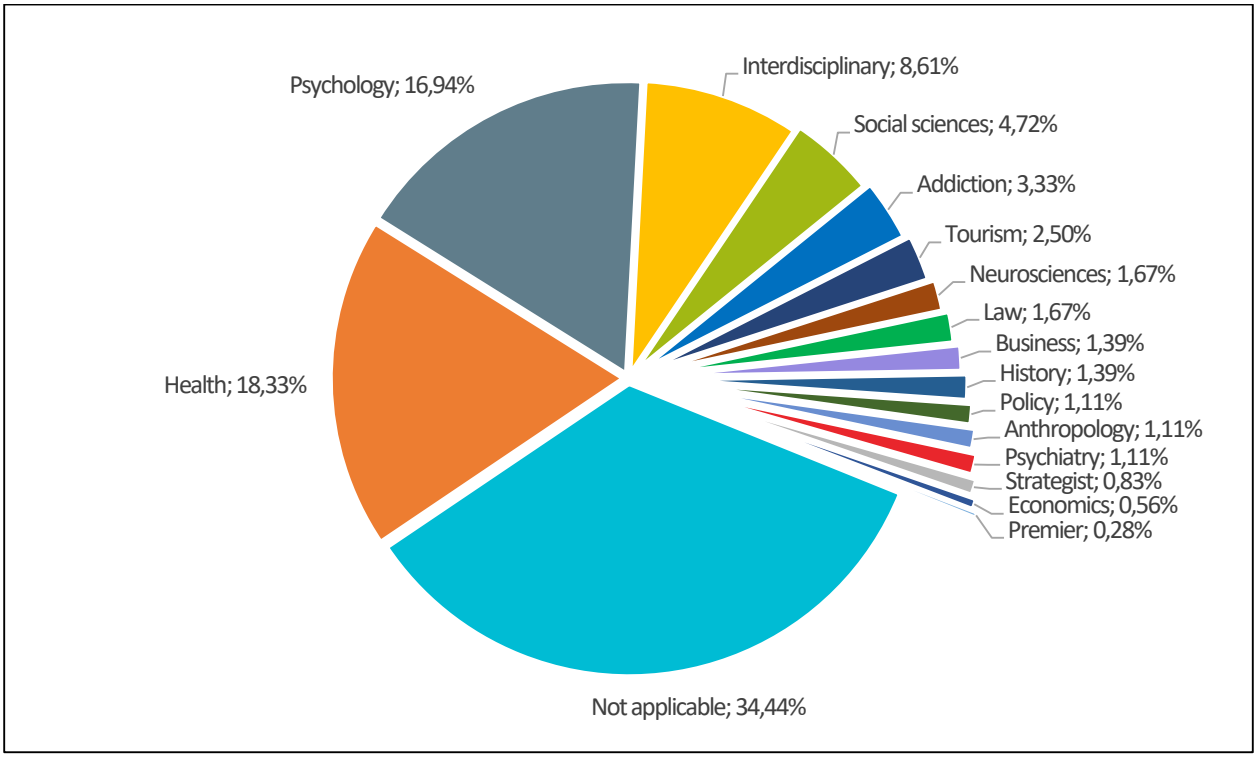

Figure 2: Academic disciplines of grey literature research publications on gambling, according to first-author affiliation (N=360).

Despite these limitations, there are some interesting parallels. Where data were available, they grey literature was more diverse in the total number of disciplinary approaches, but when we focus on the major categories, they are very similar. In the primary literature we expect psychology, health, psychiatry, and neuroscience to dominate as was found in previous research. For the grey literature, on the other hand, our previous analysis found that the grey literature tended to investigate broader societal and population issues, so we might expect less to see less psychological approaches and more social sciences. However, we in the grey literature sample we see psychology is still much larger than the social sciences and other disciplines.

Discussion

This study represents the first broad-scale descriptive and thematic analysis comparing the primary and grey literatures of gambling research. We found that grey literature represents a significant portion of gambling research produced: an average of over 20% of all research documents across the five countries in the sample. The proportion of grey literature varied a lot between the five countries, with the greatest outlier being New Zealand where 49% of gambling research documents were grey publications. New Zealand is also unique in the sample as it is the only country where the gambling legislation requires the government to take public health approach to gambling programmes, including government-funded gambling research (Government of New Zealand, 2003, s.317). This unique model may be specific to gambling or reflect broader cultural differences with how health research or research in general is produced and published. In either case, a stronger culture of publishing gambling research as grey literature may positively affect the quality of the grey research itself: If grey research reports are well-regarded in New Zealand and academics are therefore more incentivized to produce them, the research may be more robust.

The findings of our content analysis are important as they demonstrate the unique value of gambling's grey literature. In the primary literature we found a focus on

individual gamblers and their psychological characteristics, as has been reported in previous mapping reviews. On the other hand, the grey literature tended to focus on broader social and population-level issues, as well as minimizing gambling harm. This is not surprising because the majority of grey literature gambling research is funded by government bodies, and governments are accountable to their whole population and are responsible for the health and well-being of the people. We however note that gambling grey literature research in our study may still represent the states' interests in a neoliberal "responsible gambling" approach to gambling policy, whereby the responsibility to prevent gambling harm is downloaded onto individual citizens who gamble.

The quality of gambling grey literature has been questioned but has yet to be assessed. Regardless of this, our finding that gambling's grey literature has some overlap and some differences from the primary literature justifies its inclusion in systematic and scoping reviews as this will yield more comprehensive knowledge syntheses on gambling. Additionally, by including gambling grey literature in systematic reviews, the quality of the studies will be assessed by subject matter experts performing the reviews, thus shedding light on the actual relative quality of gambling's grey research.

Our preliminary disciplinary analysis did not find dramatic differences in the disciplinary approaches between primary and grey gambling research, but taken together with the results of the content analysis, the similarity is interesting. As expected, the primary literature focuses on individual gamblers and their behaviour and thus is dominated by the disciplines of psychology, health, psychiatry, and neuroscience. On the other hand, the grey literature is focused on broader population-level health and social issues, so we might expect disciplines such as health, social sciences and economics to dominate. Although "Health" is the largest discipline in the grey literature sample, "Psychology" is a close second, and the proportions of both social sciences and economics are lower than in the primary literature sample. One possible explanation is that because most of the primary academic research is psychological, most of the researchers who become recognized "gambling experts" are psychologists, who are then called upon to do the (primarily non-psychological) gambling research for governments and other grey literature producing bodies. As the field of gambling studies is already criticized for being overly focused on perspectives of psychology and related sciences, this would be another argument to create more space for social science and humanities research into gambling in academic settings.

Study Limitations and Future Work

This study is the first of its kind and its results should be taken as preliminary. In particular, the dataset is limited to a recent five-year window and the grey literature sample was only retrieved from one database. Although the GREO Evidence Centre database's topic scope matches this project perfectly and is a strong collection in the five study countries, the database is operated by a Canadian organization and thus Canadian grey publications may be more fully represented in this dataset than other nations; in particular the United States may be underrepresented as it is a large country with gambling research and policy publications spread across fifty states. The disciplinary data is also limited as a large number of documents were coded as "Interdisciplinary" and "Not Applicable". Another analysis of the primary literature sample found that "Interdisciplinary" articles mirrored the dominant disciplines of psychology, health, psychiatry, and neuroscience (Akçayir et al., Forthcoming 2021), but more complete data coding must be done for the grey literature for further comparison.

Our forthcoming work aims to address these limitations. We have expanded a timeframe to 1996-2018 to allow for longitudinal analysis of trends, and the grey literature search has been thoroughly expanded to a full systematic search following current guidelines (Godin et al., 2015). This future work will continue to use a big data meta-analytic approach explore the characteristics of gambling grey literature in other areas of critical interest, such as publication types and funding sources. In keeping with the principles of Open Science, the complete dataset of the project including data from this pilot study will be published to a data repository in 2021.

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22° International Conference on Grey Literature. Applications of Grey Literature for Science and Society. November 19, 2020 (online Conference)

GreyGuide: an example of Open Access Publishing in GL

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Dominic Farace, GreyNet International, Amsterdam, NL

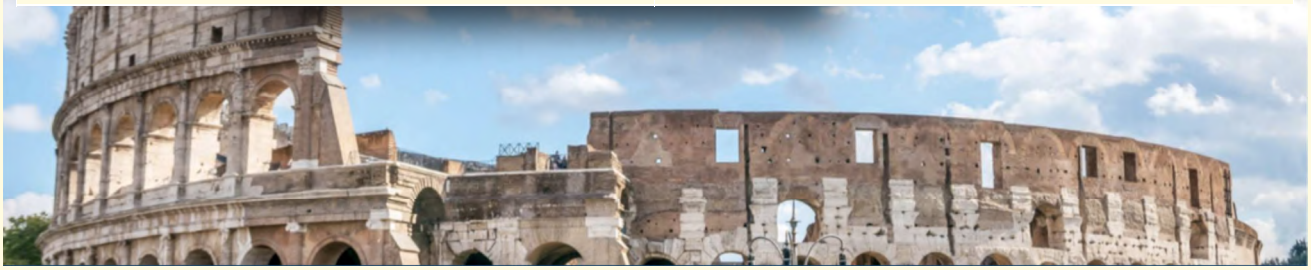
GreyGuide

Repository and Portal to Good Practices and Resources in Grey Literature

Welcome to the GreyGuide: point of access to Grey Literature and Open Access Resources http://greyguide.isti.cnr.it/

The poster shows the goals achieved in the last 5 years, the progress, new features and new resources made available by GreyGuide in support of Open Access Publishing.
In 2015, GreyNet International carried out an online survey among its stakeholders in order to determine their use of its sustained information resources.

Now five years on, having benefited from technical developments, the migration of hundreds of metadata full-text records, and the addition of enriched fields and functionality, the GreyGuide offers GreyNet a testbed from which to map and measure its capacity in open access publishing.
The population of this study is drawn from digital resources accessible via both the GreyGuide Portal and Repository.



Scenario

GreyNet's web-access portal and repository is the GreyGuide – an internet resource that is fully open access compliant, launched in 2013 as a collaborative effort between GreyNet International and CNR-ISTI, NeMIS Lab,Pisa, Italy.
GreyGuideRep is a platform supporting document submission, curation, preservation and sharing.

Objective

Pays particular attention to Open Access Publishing .
Shares Research and Knowledge in the field of Grey Literature via the GreyGuide Portal and Repository.
Meets the needs of different levels of users and increases the visibility and reuse of documents and research data.

What's on

- **New resources** in Document Share enabling wider public access to Grey Literature;
- **DOIs** for GL-Conference Papers and diverse types of RGL documents;
- **More accreditated Identifiers**: OpenDoar, DOI, ORCiD, CC BY;
- **Open access to the largest Collection** of GL Conference Posters and Slides.
- **We are Joining OpenAire**

The way in which the digital resources are openly accessible

Web Access Portal (Document Share)

Conference Posters	Conference Slides	Program Books	Conference Proceedings	GreyNet Newsletters	GL Advertorials	Grey Forum Series	GL Conference Videos

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Conference Preprints	OpenAIRE GreyNet Publications	Research Datasets	GreySource Index	GL Guides	GL TIB-AV Videos

Web Access Repository

GLA Conference Abstracts	GLP Conference Papers	BIO Biographical Notes	RGL Resources of GL

GreyGuide Repository Accredited Identifiers

OpenDOAR — Registry of Open Access Repositories
CC BY SA — Open Access Compliance
doi — Unique Digital Object Identifiers
ORCID — Connecting Research and Researchers

GreyGuide is a point of access to other Grey Literature Resources

- WorldWideScience.org Gateway
- INIS, International Nuclear Information System Repository
- NUSL, National Repository of Grey Literature
- TIB AV-Portal, A web-based platform for quality-tested scientific videos
- e-LiS Repository
- APO, Analysis & Policy Observatory

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GL2021

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Digital Transformation of Grey Literature: Exploring Next Generation Grey

OBA Forum - Amsterdam, Netherlands ● 6-7 December 2021

www.textrelease.com Grey Literature Network Service www.greynet.org

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