The Systematic Review of Literature in LIS: An approach

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ABSTRACT

Systematic reviews have become an important source of information and very popular in knowledge areas as health and allied sciences, but nevertheless, despite its indisputable benefits, they are yet infrequently used in Library and Information Science research (LIS). Systematic reviews are a type of scientific research that aims to integrate in an objective and systematic manner the results of empirical studies on a particular research problem in order to determine the state of the question in its field of study. In this paper, we provide a brief survey on the literature reviews in the social science area and we propose the adoption of the systematic review as a methodology for recovering, analyzing, evaluating and critical appraising the relevant literature in library and information science (LIS).

CCS Concepts

• **Information systems~Information integration** • **Information systems~Content analysis and feature selection** • *Applied computing~Digital libraries and archives*

Keyword

Systematic reviews; Literature reviews; Library and Information Science; Social Sciences

1. INTRODUCTION

Carry out a review of the literature has been traditionally a way to demonstrate knowledge about a particular field of study, including vocabulary, theories, key variables and phenomena, methods and history. Conducting a literature review it will also report about researchers and research groups influential in a particular area [1].

However, authors such as Xu et al. [2] go further in assessing the importance of literature review stating that all primary research must be preceded by a systematic review.

These systematic reviews are scientific research that the unit of analysis is the primary original studies from which it is intended to answer a research question clearly formulated through a systematic and explicit process [3].

Unlike traditional or narrative reviews, systematic reviews should have a number of elements or characteristics [4]:

- a clearly stated set of objectives with pre-defined eligibility criteria for studies

- an explicit, reproducible methodology

- a systematic search that attempts to identify all studies that would meet the eligibility criteria

- an assessment of the validity of the findings of the included studies, for example through the assessment of risk of bias

- a systematic presentation, and synthesis, of the characteristics and findings of the included studies

These reviews have acquired great importance and development in the field of Health Sciences in general and in the Evidence- Based Medicine in particular, and at the present time are being incorporated into other scientific areas such as Social Sciences [2].

However, in this area and more specifically in LIS there are gaps in knowledge regarding the use of this methodology and certainly, although there are reports, guidelines and lists of bibliography on different topics, we found hardly systematic literature reviews that can be replicated in this field.

In any case, the literature review can be finally and with some modifications a "legitimate and publishable scholarly document" [1].

2. OBJECTIVES
The objectives of this paper are to provide an overview of what are the most common types of review in Social Sciences, Humanities and LIS and identify possible patterns for the development of systematic reviews in this area of knowledge.

3. THE LITERATURE REVIEW
As stated above, literature reviews give researchers the ability to stay informed and updated on an area of interest, therefore they have a great demand in most fields of research. Their need stems from the growing publication of scientific papers [5]. This steady increase in publications hinders that scientists can examine in detail each of the publications that might be relevant to their interests [6]. So it is necessary to have regular reviews of recent literature. Although recognition of scientists comes mainly from primary research, the specific literature reviews may lead to new synthetic knowledge [7]. However, for these may be useful should be compiled in a careful and accurate [8].

Maier [9] refers to the importance of quality in literature reviews, as its purpose is to identify knowledge gaps and research needs in the field or research area. On the other hand, the quality of the review will also have a significant impact on the quality of the rest of the document, including the methodology, results and conclusions, as illustrated at Figure 1.
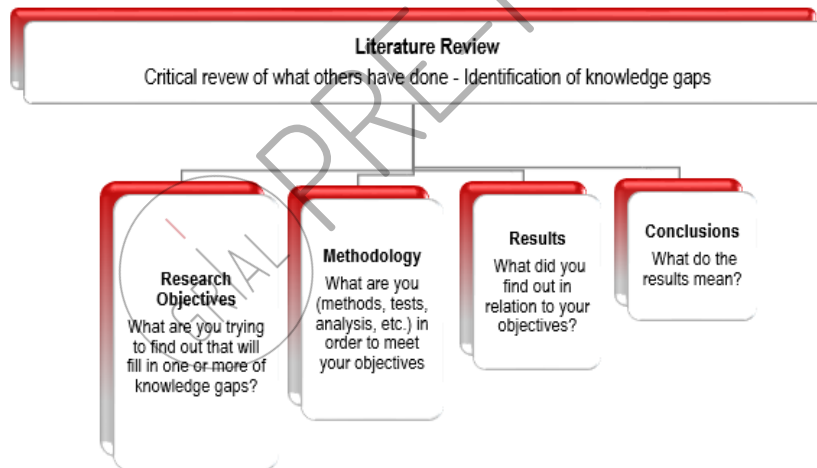

Figure 1. Modified from Maier (2013). Conceptual representation of the impact of the literature review on Objectives, Methods, Results and Conclusions.

To Pautasso [10] when starting from scratch, reviewing the literature can require a titanic amount of work. He argues that to conduct a review the researcher requires a set of capabilities that allow you to perform multiple tasks such as search, evaluation and synthesis of information from various sources; also, he must have critical thinking to evaluate and paraphrase, and possess skills of citation. The author defines ten simple rules for writing a review of the literature.

Table 1. The ten rules of Pautasso

Rule 1	Define a topic and audience
Rule 2	Search and re-search the Literature
Rule 3	Take notes while reading
Rule 4	Choose the type of review you wish to write
Rule 5	Keep the review focused, but make it of broad interest
Rule 6	Be critical and consistent
Rule 7	Find a logical structure
Rule 8	Make use of feedback reviews
Rule 9	Include your own relevant research, but be objective
Rule 10	Be Up-to-Date, but Do Not Forget Older Studies

3.1 Types of literature reviews

According Cooper [11] there are several models of reviews that differ considerably in terms of fundamental objectives, motivations and means by which they are held. In fact, the term "review" is surrounded by great confusion and many ambiguities [12]. These authors describe how researchers have used many terms to describe their review methods and approaches such as narrative review [13], theoretical review [14], critical review [15], descriptive review [16], comprehensive review [17], systematic review [18] and meta-analysis [19].

Traditionally they have been making a type of review called narrative. This type of reviews raises the drawback that it uses informal, explicit and often personal and subjective methods. The main drawbacks of narrative reviews are on the one hand that authors don't specify the process followed to search, collect and evaluate information and the other that that because to absence of this information, readers are not able to repeat and verify the results and conclusions of the reviews [20].

Petticrew and Roberts [21] established ten types of literature reviews. For their part, Grant and Booth [22] described 14 types of reviews and associated methodologies. Their proposal tried to determine the prevalent terminology, a process known as literary warrant. As of this, they were identified and mapping common types of review and its key topics through a framework Search, Appraisal, Synthesis and Analysis. The authors analyzed each type of review, described its characteristics and sketched the strengths and perceived weaknesses in each.

Regarding the systematic reviews, Saénz [23] defines it as that in which there is an exhaustive search of relevant studies on a subject. Once the studies have been identified and obtained, the results are synthesized according to a predetermined and explicit method. This form of review offers the advantage of the opportunity to replicate and verify if you come to the same conclusion.

For Petticrew and Roberts [21] the systematic reviews are reviews of the literature that are closely linked to a set of scientific methods which aims at limiting the systematic error or bias, trying to identify, evaluate and synthesize all relevant studies in order to answer a particular question or set of questions.

3.2 The systematic review in LIS

Medical librarians have adopted and implemented very quickly this methodology [24]. Later, it has spread to other nonmedical areas, such as scholarly, software engineering [25, 26] or LIS education programs [22].

From reading the works of these authors it deduces that the systematic review must meet at least three conditions: use of academic databases as a primary source; indicate the inclusion criteria (and if applicable, exclusion) to select the works to be part of the corpus of analysis; and provide data to replicate the study review. In most cases, the lack of systematic reviews in the area of LIS is due to the limited amount of methodological details and lack of rigorous processes, explicit and replicable review, as they point [27].

Xu et al. [2] make a systematic review of systematic reviews in the LIS field. The aim of his research is to propose a framework of critical appraisal that is appropriate in this field of knowledge according to established guidelines. Other studies addressing the importance of the subject are those of Templier and Paré [12] and Petticrew and Roberts [21].

4. THE SYSTEMATIC REVIEW PROCESS

Before beginning a systematic review, we should ask and answer two questions: first, if its implementation is necessary and the second if we have the resources to carry it out. If the answer to the two questions is affirmative, it be will relevant start the review process.

4.1 Method or Protocol

According Petticrew and Roberts [21] it does not make sense to make a systematic review that has already been done before, unless it is clear that previous systematic reviews are biased, or are significantly outdated, for example, if it was published new studies since it was completed the existing review. Because this reason, it is important to start any new review by searching existing systematic reviews, to avoid duplication.

According the authors all systematic review must have a protocol that includes the research question, the methods to be used to answer, types of studies and designs that the reviewer intends to locate, how they will be located, evaluated and finally synthesized these studies.

4.1.1 Defining the question. Types of questions

At the beginning of the review it is necessary to specify clearly the questions that the review aims to answer. Although the systematic reviews often aim to find answers to individual questions, or test a single hypothesis, sometimes the field can be expanded and it is necessary to identify the question or key questions that must be answered.

From these considerations, previous to the review, the next step is the redefinition of the questions and the establishment of relevant boundaries following the guidelines outlined below.

It could helpful to start by dividing the review question down into sub-questions. The question can be translated to PICO(C) format (population, intervention, comparison, outcomes, (context)).

If the review aims to answer a question about effectiveness (e.g. the effectiveness of open access in the increase citation doctoral theses), it could be translated as follows:

1. Population: What population are we interested in? For example, scientific gray literature? And if so, what kind? PhD theses in open access?

2. Intervention: What interventions exactly are we interested in reviewing? Is it one intervention, or a cluster of interventions. There may be several related interventions used to address the same problem. For example, an intervention would be the deposit of PhDtheses in institutional repositories, and other interventions would be: the open access policies that require deposit of the PhDtheses, the degree of interoperability of repositories to be harvested, the measurement of visibility and the impact of doctoral theses, etc.

3. Comparison: With what is the intervention being compared? For example, in research into the effectiveness to the dissemination of PhDtheses through institutional repositories with what can it being compared? With another way to disseminate in open access other than through institutional repositories? With nondisclosure open access?

4. Outcomes: There is a wide range of outcomes for many of the interventions; the assessment of effectiveness involves collecting information on both positive and negative impacts, and assessing the balance between them. Specifying the review question is important to determine which results are most relevant to answer the question.

5. Context (optional): For reviews of some interventions there is an additional component, which must be considered, it is the context within which the intervention takes place.

4.1.2 Establishing inclusion and exclusion criteria

After defining the research questions and objectives, the next step in a systematic review of the literature is to define the criteria for inclusion and exclusion of studies.

Inclusion criteria:

- Studies on the topics proposed in the research questions that indicate state of the question, results and conclusions, and in some cases can solve the most specific questions through an analysis process.

- Knowledge areas: the work can be framed in any area of knowledge that addresses issues related to the research questions, but if the search results are very numerous and are not relevant will be refined by research areas restricted to: Sciences Information and Documentation, Libraries, Information and Communication.

- Types of studies that it requires to locate to answer the questions.

  - Articles.
  - Books and book chapters.
  - Theses and Dissertations.
  - Congresses and conferences.
  - Reviews.
  - Bibliographies.

- Language of the works.

- Time limits more appropriate on the topic of study.

Exclusion criteria:

- Contents that deviate from the topics of the posed questions.

4.1.3 Carrying out the search of literature. Search strategy for identification of literature

After conveniently establish the research questions and the inclusion and exclusion criteria, the next step is to carry out a comprehensive literature search in locating relevant studies. Identifying and locating the evidences or proofs available in the literature involves establishing a systematic literature search strategy that allows find the relevant literature, published or not, containing possible answers to the established questions. It is also necessary that this is easily reproducible and applicable to most existing databases and other available resources. The

strategy should be based on the elements of the review question with the study design that is considered most appropriate [28]. This involves determining the location (where) and terminology (how) that will be used in the search. It is essential to know the sources of information available for efficient information retrieval.

According to Petticrew and Roberts [21] the starting point for conducting the literature search, often, is the search of electronic databases (Web of Science (WOS), Library and Information Science Abstracts (LISA), Library, Information Science and Technology Abstracts (LISTA), Scopus, DOAJ, BASE, TDR, DART-Europe, SciELO, etc.). However, in systematic reviews, not only the databases must be considered the only source. In many research areas, particularly in the social sciences, the bulk of the relevant evidence may not appear in journals, but will be located in reports in the gray literature, much of which may not be indexed in electronic databases. The type of information being sought will depend on both the review question and the inclusion criteria. Published journal papers, and other published and unpublished reports of studies will probably be included. The latter could be located through searches of conference papers, theses and abstracts do other gray literature. Searches also need to include book chapters, especially in social sciences, because these could refer to results of studies ever published in reviews (systematic or not) and could also be sought "by hand" primary studies. To all these criteria described by Pettigrew and Roberts [21], other sources such as repositories, harvesters, digital libraries and scientific search engines like Google Scholar could be added.

As for the terminology and formulation of the search strategy, an effective equation of search would be, for example, formed by descriptors and their respective qualifiers or descriptors and keywords combined together by the most appropriate Boolean operators. The use of descriptors is an option to locate the work related to a topic of interest to facilitate their recovery and to give visibility to scientific articles. The descriptors are not only useful to perform a literature search, but also they serve to analyze the work areas of knowledge [28].

Before formulating a search equation must be established clearly and accurately the search terms to then establish logical relationships that will occur between them. To join related concepts, it will be used the OR operator (union operator); to relate terms that refer to different concepts in a document it use AND (intersection operator); to remove documents containing the unwanted term it use NOT (excluding operator). When formulating equations more complex search, where several operators are combined, parentheses are used to indicate which operation must be carried out the first [20].

It is important to describe the used search strategy and all procedures employed.

4.1.4 Reviewing the process and evaluating the studies
After the search of the relevant literature, it must evaluate the results.

It is advisable to make a first selection through the titles and abstracts retrieved.

The assessment of the relevance of documents must be done thoroughly and independently by the reviewers. It is also important as indicated by Ferreira Gonzalez [3] measured the degree of agreement between reviewers, for which can be used the kappa statistic index to the strength of the correlation between authors. In case of discrepancy it should be designated a third researcher.

To manage the results obtained in the various used databases it is useful the references managers like EndNote, Mendeley, etc.

Both the search process and the selection must be detailed by a flowchart in which clearly specifies all phases of the process: databases consulted indicating the documents obtained from each of them,

Therefore, the search process and the selection must be detailed by a flow diagram that specifies clearly all stages of the process: databases consulted indicating the documents obtained in each, the number of articles or documents obtained by other processes, and deleted at each stage of the process and the reasons for their removal documents. Figure 2 shows flow of information through the different phases of a systematic review, proposed by the PRISMA Group [29].
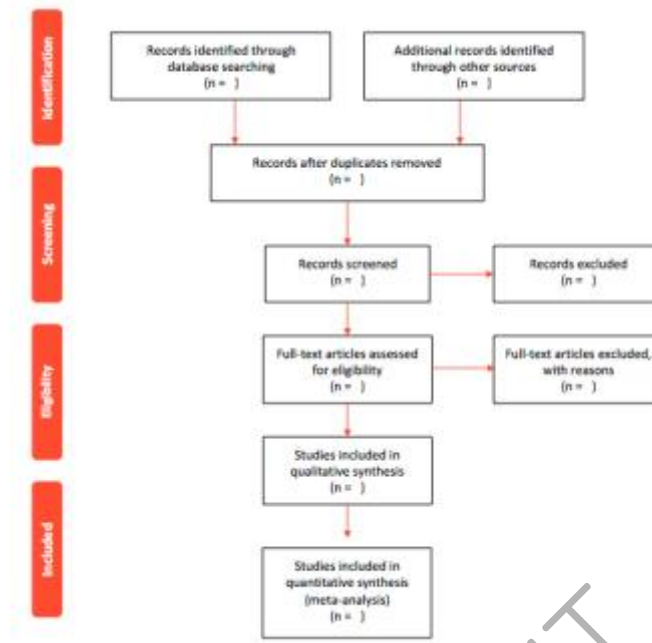
Figure 2. Flow diagram modified from PRISMA (2009).

At Annex, we show an example on visibility, use and impact of scientific grey literature in open access that illustrates the procedure to follow in the first phases of the protocol of a systematic review.

4.1.5 Extracting data

After completing the screening, it is necessary read and review the literature that meets all inclusion criteria. At this stage of data mining, the specific elements that must be collected vary for each work and it need to be guided by questions and research objectives.

Systematic reviews adopt a formal and systematic approach to extract relevant information from primary studies, which often involves the development of a data extraction form that the reviewer will completed for each of the studies in the review.

4.1.6 Synthesizing, analyzing and presenting data

Data synthesis involves collecting and summarizing the results of the primary studies. The included studies can be integrated quantitatively using statistical methods (meta-analysis) and / or qualitatively systematically describing, tabulating and integrating the results. In the first stage, the data synthesis involves mapping the main components of literature, that is, tabulate the results to identify how many studies met the inclusion criteria, who were their authors, etc. La siguiente etapa consiste en identificar los temas importantes, etc. The next step is to identify the important topics, etc. The final stage is to review the literature in depth and explore the quality of the works according to the fulfillment of the objectives pursued in the research questions and highlight the deficiencies in the literature. These three stages are useful for conducting systematic reviews framework.

On the other hand, all the works that meet the inclusion criteria should be assessed for methodological solidity. This process helps to identify the most important features. It also helps the reader to interpret the data. The results of the critical evaluation are used to synthesize the results of the primary studies.

5. CONCLUSIONS

Although in our field research the systematic review is still a relatively unknown method and we don't found the bibliographic corpus resulting from a systematic review of the literature, we believe that are useful in assessing research needs and can be the starting point for further research.

An important element in the systematic review process should be the detailed documentation of the processes of search and selection of articles and documents located in order to make it reproducible.

Systematic reviews provide methodological quality of the research, which are of great interest in the research work of doctoral programs and particularly in those with a clear interdisciplinary approach, as in the case of the research work of Education in the Knowledge Society PhD Programme of the University of Salamanca.

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Annexes

One of the most important steps of a systematic review is the identification of relevant publications to respond the research question. We show below an example that illustrates the procedure to follow in the first phases of the protocol of a systematic review on visibility, use and impact of scientific grey literature in open access.

1. Defining the question. Types of questions. Applying PICOC Model:

P	I	C	O	C
Population	*Intervention*	*Comparison*	*Outcomes*	**Context**
Scientific grey literature (PhD theses)	Diffusion of PhD theses through the Open Access institutional repositories	PhD theses that are not Open Access	Increased visibility and impact of Open Access PhD theses	University of Salamanca. 2006-2010
Scientific grey literature (PhD theses)	Open Access mandate at the institutions as from a date	PhD theses that are not subject to mandate in the same institutions	Increased visibility and impact of PhD theses in Open Access by institutional mandate	University of Salamanca. 2008-2010
Institutional Repositories	Implementation of tools in repositories to achieve interoperability	Comparison between multiple repositories measuring the ratio and degree of visibility interoperability	The most interoperable repositories increase visibility	At international level

2. Determining the location (where). Selection of resources:

*   Electronic databases: Web of Science, Scopus, LISA, LISTA.
*   Searching "by hand" in summaries of journals and open access resources.
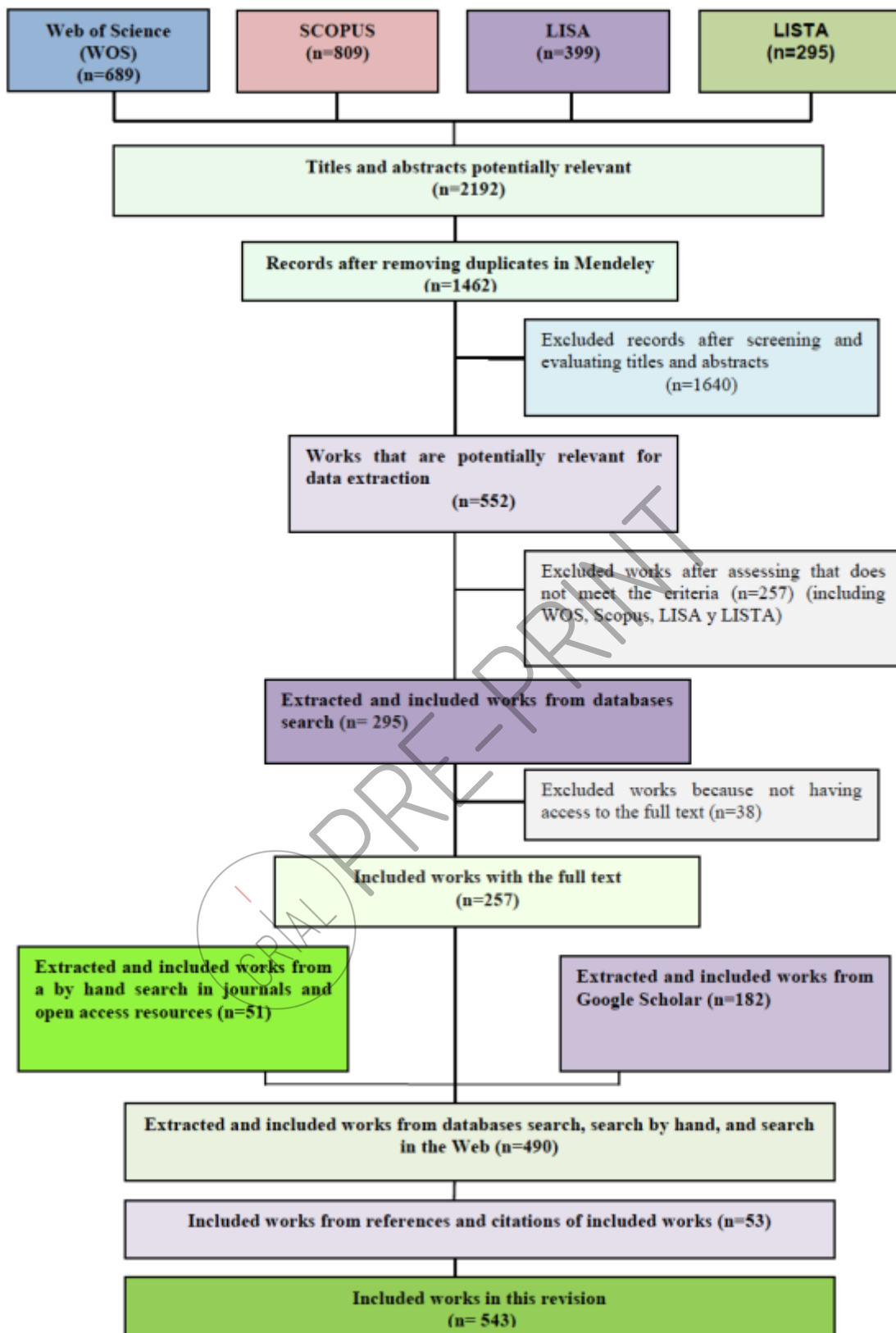*   Searching at Google Scholar.

3. Determining the terminology (how). Search equation used (adapted to the various databases utilized).

("Open Access" OR "Acceso abierto") AND (visibili* OR impact* OR cita*) ; ("literatura gris" OR "grey literature" OR "gray literature" OR "littérature grise" OR e-theses OR theses OR dissertations OR tesis OR "tesis electrónicas") AND ((dissemination OR diffusion OR difusión OR diseminación) OR (citation OR citación)) ; Repositor* AND Interoperabili*) AND (visibili* OR impact*) ; ("Open Access" OR "Acceso abierto") AND (mandat* OR poli*) AND (visibili* OR impact*) ; ("Open Access" OR "acceso abierto) AND (bibliometric* OR almetric* OR informetric* OR scientometric* OR webometrics) ; ("open access" AND impact) AND (bibliometric* OR almetric* OR informetric* OR scientometric* OR webometrics)

4. Selection of potentially eligible documents:

*   Application of inclusion and exclusion criteria to the titles and abstracts obtained.
*   Getting potential articles from the eligible titles and summaries.
*   Assessment of coherence in the selection of studies.

5. Flow diagram of the selection of works for inclusion in the systematic review

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┌─────────────┐  ┌─────────────┐  ┌─────────────┐  ┌─────────────┐
│ Web of      │  │  SCOPUS     │  │   LISA      │  │   LISTA     │
│ Science     │  │  (n=809)    │  │  (n=399)    │  │  (n=295)    │
│ (WOS)       │  │             │  │             │  │             │
│ (n=689)     │  │             │  │             │  │             │
└─────────────┘  └─────────────┘  └─────────────┘  └─────────────┘
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Titles and abstracts potentially relevant
(n=2192)

Records after removing duplicates in Mendeley
(n=1462)

Excluded records after screening and evaluating titles and abstracts
(n=1640)

Works that are potentially relevant for data extraction
(n=552)

Excluded works after assessing that does not meet the criteria (n=257) (including WOS, Scopus, LISA y LISTA)

Extracted and included works from databases search (n= 295)

Excluded works because not having access to the full text (n=38)

Included works with the full text
(n=257)

Extracted and included works from a by hand search in journals and open access resources (n=51)

Extracted and included works from Google Scholar (n=182)

Extracted and included works from databases search, search by hand, and search in the Web (n=490)

Included works from references and citations of included works (n=53)

Included works in this revision
(n= 543)

The last steps of the protocol would be as listed below:

6. Reviewing the process and evaluating the studies

7. Extracting data

8. Synthesizing, analyzing and presenting data