

Foundations of Narrative Bibliometrics

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Abstract: *The document 'Foundations of Narrative Bibliometrics' provides an analysis of the evolution of scientific assessment, highlighting the influence of manifestos such as DORA and CoARA in shaping ethical and responsible practices in academia, as well as their assimilation by Spanish scientific policies. It connects this context with the contributions of evaluative bibliometrics, emphasising the transition towards a more integrative approach that advocates for a balance between quantitative and qualitative methods in research evaluation. Furthermore, it underscores how the Narrative Curriculum has emerged as one of the fundamental tools in new evaluation processes, as it allows for the description of the complexity and context of academic achievements. Narrative Bibliometrics is proposed, defined as the use of bibliometric indicators to generate narratives and stories that support the defence and exposition of a scientific curriculum and/or its individual contributions within the framework of a scientific evaluation process. To introduce the reader, it presents, in a non-exhaustive manner, sources, indicators, and practical cases for effectively applying narrative bibliometrics in various scientific evaluation contexts. Hence, this document is offered as an introductory tool for evaluators and researchers for a responsible use of bibliometric indicators.*

Keywords: *Responsible Metrics, DORA, CoARA, Evaluative Bibliometrics, Narrative Curriculum, Narrative Bibliometrics, Databases, Bibliometric Indicators, Narratives*

1. THE NEW EVALUATIVE FRAMEWORK

1.1. The winds of change

In the realm of scientific evaluation, a new model of assessment has been developed over recent years, articulated in three clearly defined phases. The first phase is characterised by the publication of a series of manifestos and declarations, culminating in the consolidation of a movement towards the responsible use of metrics (Pérez Esparrells et al., 2022). In the second stage, the assimilation of the manifestos is observed, along with a growing commitment by some institutions towards the development of more sophisticated indicators and ethical evaluative practices more adapted to the specific context of evaluations. The third phase involves the institutionalisation of these principles through the creation of alliances such as CoARA (Coalition for Advancing Research Assessment)¹, representing the formalisation of the Open Science movement's aspirations and values into robust organisational structures aimed at promoting systemic and global changes beyond mere publication and data openness, but at the very core of the scientific evaluation process; changes fundamentally guided by the use of qualitative judgements and peer review, to the detriment of bibliometric indicator usage (Torres-Salinas et al., 2023).

The current moment is marked by the integration of these principles into evaluative practice. In Spain, the effective implementation of these principles by ANECA (National Agency for Quality Assessment and Accreditation)², as detailed in the recent Resolution of December 5, 2023, from the National Commission for the Evaluation of Research Activity, publishing the criteria for the evaluation of research activity³, constitutes a significant case study due to the implications ANECA has as the agency responsible for accreditations and tenure in Spain and, therefore, as an inspiration for other national scientific policies. But, how did we reach this point? Let's briefly review the different movements that bring us to the present, focusing on the role of the quantitative school in the evaluation processes of scientific activity.

Bibliometrics, as a field of study, has significantly evolved in the last part of the 20th century, consolidating as an applied discipline initially based on the counting of citations and publications. Throughout the 20th century, the process of retrieving bibliographic citations in scientific works was monopolised by a single company⁴, which commercialised the so-called Citation Indexes (Science Citation Index and Social Science Citation Index), later known as Web of Science (WoS), as well as the well-known Journal Citation Reports (JCR), which included the—now repudiated and criticised— Journal Impact Factor (JIF) as its star indicator.

Bibliometric indicators were adopted en masse at the expense of an exclusive dependence to obtain them from a single data source (WoS), despite its obvious limitations in bibliographic coverage (Mongeon & Paul-Hus, 2016). The main consequence has been a predominant and decisive use of the JIF in evaluating the scientific impact of articles and researchers by evaluation agencies and scientific institutions, despite the recommendations of its own creator (Garfield, 2002) as well as hundreds of works and editorials that denounced the limitations linked to its misuse (Larivière & Sugimoto, 2019). However, the JIF consolidated its reign based on its ease of understanding, low cost, and speed of calculation, promoting an extensive and global use of metrics. Nonetheless, from the year 2004 onwards, the situation began to change.

¹ <https://coara.eu>

² <https://www.aneca.es>

³ <https://www.boe.es/boe/dias/2023/12/16/pdfs/BOE-A-2023-25537.pdf>

⁴ The Institute for Scientific Information was later transferred to Thomson Reuters and is currently owned by Clarivate Analytics.

107 On one hand, a greater number of information sources were introduced to the market⁵,
 108 allowing for a diversification in citation acquisition, which in principle, mimicked the existing
 109 model and replicated with some variables the main indicators. Moreover, the digital era and
 110 Web 2.0 contributed to the emergence of new digital metrics (Bollen et al., 2005), expanding
 111 the quantitative horizons towards so-called webometrics (Thelwall, 2008), and ultimately
 112 generating a complete and infinite family of alternative indicators (altmetrics) (Torres-Salinas
 113 et al., 2013). This transformation led to a significant increase in the supply of sources,
 114 indicators, methodologies, and techniques, also favouring quantitative evaluation at the
 115 article level, thereby reducing the dependence on journal-based metrics or other publication
 116 aggregates.

117
 118 This context led to reflection processes that resulted in the publication of various manifestos
 119 and declarations. These manifestos primarily aimed to criticise certain bibliometric practices
 120 and indicators, especially the JIF and the H-index. They also encouraged the adoption of
 121 good practices in the use of bibliometric indicators, promoting their adaptation to the new
 122 realities of scientific research and the incorporation of new metrics, more in line with the new
 123 platforms for the publication and dissemination of scientific knowledge. Among the most
 124 influential and decisive documents are the San Francisco Declaration on Research
 125 Assessment (DORA)⁶ and the Leiden Manifesto⁷ (Hicks et al., 2015).

- 126
 127 ● *DORA (San Francisco Declaration on Research Assessment) (2012)*: This Declaration
 128 advocates, in the metric part, for the elimination of the emphasis on the JIF as the main
 129 reference and focuses on evaluation based on merit and the actual impact of research.
 130 DORA is one of the first Declarations to address the need to change the way research is
 131 evaluated with global influence.
 132
- 133 ● *Leiden Manifesto (2015)*: This manifesto focuses on providing principles for research
 134 evaluation and decision-making based on bibliometric metrics. It advocates for
 135 transparency in the selection of indicators, the importance of diversity in evaluation
 136 methods, and the need to consider the disciplinary context in research evaluation.
 137

138 While Leiden and DORA have been the most relevant activities, they have not been the
 139 only ones, being complemented by other sector-specific manifestos, among which the
 140 Altmetrics Manifesto⁸ and the Metric Tide report (Wilsdon et al., 2015) particularly stand
 141 out in our field.
 142

- 143 ● *Altmetrics Manifesto (2010)*: The Altmetrics Manifesto highlights the importance of
 144 alternative metrics (altmetrics), focused on expanding the impact dimensions of scientific
 145 publications through the quantification of their dissemination and consumption on
 146 websites and social media platforms, as well as their mention in media and non-scientific
 147 publications (reports, guides, grey literature), through unconventional indicators beyond
 148 traditional citation metrics.
 149
- 150 ● *The Metric Tide (2015)*: An independent report by the UK Metrics Task Force on the ethical
 151 and social challenges related to research metrics of significant influence among
 152 bibliometricians. It emphasises the importance of more responsible and ethical research
 153 evaluation, highlighting the need to focus on quality and diversity of outcomes, promoting
 154 transparency and accountability in the use of metrics, and advocating for a
 155 multidimensional evaluation that includes both qualitative and quantitative indicators.

⁵ In 2004, Google Scholar (Alphabet) and Scopus (Elsevier) were launched.

⁶ <https://sfdora.org/>


⁷ <http://www.leidenmanifesto.org/>

⁸ <https://altmetrics.org/manifesto/>

156 Additionally, the report warns about the unwanted effects of an excessive dependence on
 157 metrics and hypercompetition in scientific research.

158
 159 Table 1 summarises in 10 points the key aspects of the different manifestos which, to some
 160 extent, determine the new contexts.

161 **Table 1.** Summary of the main points from the metric manifestos
 162

| | |
|---|--|
|  DORA | <ul style="list-style-type: none"> • Strongly criticises the use of the JIF of journals for funding and academic promotion decisions. • Encourages institutions and funding agencies to consider a wide range of metrics and indicators, including qualitative and quantitative metrics that reflect the actual impact. • Proposes to recognise and value the diversity of contributions in research, including data, software, methods, and other types of intellectual output that are fundamental to the advancement of science. • Promotes transparency in the publication and evaluation of research, advocating for open access and data sharing. |
| LEIDEN MANIFESTO FOR RESEARCH METRICS | <ul style="list-style-type: none"> • Emphasises the need to adapt evaluation metrics to the specific goals and contexts of each research, combining qualitative and quantitative methods. • This allows for a more complete and fair appreciation of research performance and impact in its various aspects: academic, social, economic, cultural. • Highlights the importance of transparency in evaluation methods and the accountability of evaluators. • Furthermore, it advocates for the recognition of a variety of scientific contributions (bibliodiversity), beyond publications in high-impact journals. |
| altmetrics a manifesto | <ul style="list-style-type: none"> • Seeks to broaden the understanding of academic impact beyond citations, including mentions on social networks, downloads, bookmarks, blog discussions, and media coverage, etc. • Altmetrics offer the possibility of dynamic evaluation, providing real-time data on how research outcomes are discussed and used. • Allows for valuing a wider range of academic contributions, such as research data, software, and contributions to online communities. • Altmetrics advocates for the use of open data to facilitate the verification and replication of its metrics, promoting transparency in research evaluation. |
| Metric Tide | <ul style="list-style-type: none"> • Advocates for an ethical and responsible research evaluation, avoiding excessive simplification through metrics. • Highlights the importance of considering both the quality and diversity of research outcomes. • Promotes transparency and accountability in the use of metrics, warning about the risks of excessive dependence on them. • Recommends including stakeholders in decision-making on metrics and the continuous review of evaluative approaches. |

163
164 **1.2. Old practices**

165 These advancements or consensuses within the scientific community did not emerge
166 spontaneously. Much of these practices, as we argue in an upcoming monographic work
167 (Torres Salinas, 2024), are indebted to and draw from Evaluative Bibliometrics, a specialty
168 with a defined and indisputable origin in the National Science Foundation report titled
169 “Evaluative Bibliometrics” (Narin, 1976). Subsequently, Evaluative Bibliometrics was
170 systematised during the '80s at the CWTS (Centre for Science and Technology Studies)
171 (Petersohn and Heinze, 2018), whose members defined its principles in multiple works, and
172 from which we can find recent syntheses (Daraio and Glänzel, 2020; Moed, 2017; Van Raan,
173 2019).

174
175 It should be noted that Evaluative Bibliometrics emerges as an instrumental discipline to
176 support Peer Review (Table 2), not as a substitute for human judgment, and is focused on
177 making decisions responsibly. Obviously, if there were no decisions regarding indicators, we
178 would be talking about Descriptive Bibliometrics. From its origins, therefore, Evaluative
179 Bibliometrics has promoted a fair, rational, and limited use of bibliometric indicators and has
180 also opposed the so-called ‘quick and dirty’ metrics, characteristic of Desktop Bibliometrics
181 (Moed, 2020) and salon metrics (Aguillo, 2022).

182
183 **Table 2.** Henk Moed's vision of scientific evaluation in 2007 from CWTS
184

| | |
|---|--|
| <p>“Outcomes of citation analysis must be valued in terms of a qualitative, evaluative framework that takes into account the substantive content of the works under evaluation: this can be done by peers only. The future of research evaluation rests with an intelligent combination of advanced metrics and transparent peer review. It argues that metrics, especially a sophisticated type of citation analysis, may provide tools to keep the peer-review process honest and transparent. Both metrics and peer review have their strengths and limits. A real challenge is to combine the two methodologies in such a way that the strength of the first compensates for the limitations of the second, and vice versa”</p> | <p>Moed, H. F. (2007). The future of research evaluation rests with an intelligent combination of advanced metrics and transparent peer review. <i>Science and Public Policy</i>, 34(8), 575-583.</p> <p>Henk Moed from the CWTS was one of the pioneers and popularisers of Evaluative Bibliometrics through an extensive bibliography spanning more than three decades.</p> |
|---|--|

185
186 In essence, the principles advocated by Evaluative Bibliometrics (EB) since its origins in the
187 '80s are five:

- 188
189
- 190 ● **Principle of support for decision-making:** bibliometric indicators are a tool to assist in
191 decision-making in scientific policies. The essential goal is to provide objective indicators
192 for effective evaluation.
 - 193 ● **Principle of collaboration with experts:** Bibliometricians work at the service of experts
194 from different disciplines, who use the indicators as a complement to their qualitative
195 judgements. Indicators are subordinate and complementary to Peer Review, not a
196 replacement for it.
 - 197 ● **Principle of respect for contexts:** the evaluation process and the indicators must
198 respect the context of the evaluated agents, considering the evaluation framework, career,
199 discipline, language, or type of publication.
 - 200 ● **Principle of metric multidimensionality:** there are indicators capable of measuring
201 different aspects of impact, such as scientific-academic, educational, economic-
technological, or social and cultural.

- **Principle of verifiability and data openness:** transparency, accessibility, and verification of data are necessary, ensuring their reliability, so that they provide guarantees to both evaluators and those being evaluated.

1.3. New policies

In the previous points, we have described the general context that allows us to understand the emergence in December 2022 of CoARA - Coalition for Advancing Research Assessment, an initiative strongly influenced by DORA, seeking to reform the research evaluation system. CoARA is based on an agreement, the Agreement on Reforming Research Assessment, which establishes common commitments respecting the autonomy of organisations. The coalition was driven by the European Science Foundation – Science Connect (ESF-SC)⁹ and the European Universities Association¹⁰, with the support of the European Commission, and currently brings together more than 650 organisations, including universities, R&D centres, and evaluation agencies.

Among the foundations of CoARA, it is explicitly mentioned that emphasis will be placed on qualitative aspects and the diversity of outcomes and that, therefore, research evaluation should be based primarily on qualitative judgements, with peer review as a central element, supported by a responsible use of quantitative indicators. Furthermore, CoARA advocates for a more balanced and qualitative approach in evaluation, recognising the diversity of outcomes and practices in research. This implies a change from the current dependence on quantitative indicators, seeking a more holistic and representative evaluation. Therefore, we observe that both Evaluative Bibliometrics and CoARA are based on the same principles: evaluations should be based on expert qualitative judgements, which should be complemented with bibliometric indicators.

It is common to find that DORA and CoARA are signed together, an aspect that institutions increasingly communicate publicly on social media platforms as part of their external communication policies (Orduña-Malea & Bautista-Puig, 2024). The adoption of these agreements has intensified, with the signing of both agreements by the European Commission on November 8, 2022, as announced by the Directorate-General for Research and Innovation¹¹.

Table 3. ANECA's statement following the signing of DORA and CoARA in April 2023¹²

| | |
|--|--|
| <p>“ANECA adheres to DORA because it shares the necessity to address the evaluation of the quality of scientific articles—not just the journals in which they are published—, to consider the value and impact of all research outputs (including data and software), and to consider the social impact of research from a broader perspective (including qualitative indicators, such as influence on policies and/or scientific practices).”</p> | <p>“Likewise, ANECA adheres to CoARA, committed to recognizing the diversity of research practices and activities in evaluation processes, which also maximize their quality and impact, achieving a more efficient and inclusive system. To this end, it commits to progressively moving towards qualitative evaluation models, based on peer review, and with the support and responsible use of quantitative indicators.”</p> |
|--|--|

⁹ <https://www.esf.org/>

¹⁰ <https://eua.eu/>

¹¹ In the EU press release on the signing of CoARA and DORA, there are two interesting points. On one hand, the statements by Mariya Gabriel, Commissioner for Innovation, Research, Culture, Education and Youth, emphasize that these signings are "commitments from the European Commission to pave the way towards a reform of research evaluation practices." This means we are at the beginning of a reform, not an end. On the other hand, it is included as an action in the Policy Agenda of the European Research Area (ERA) for 2022-2024, which includes an action to advance the reform of the research evaluation system, researchers, and institutions..

¹² <https://www.aneca.es/-/aneca-se-adhiere-a-la-san-francisco-declaracion-on-research-assessment-dora-y-a-la-coalition-for-advancing-research-assessment-coara->

As a direct consequence, numerous institutions have followed this trend. In the Spanish case, the support for CoARA is beyond doubt, being the country with the most adhesions to the principles, including, among others, significant bodies and institutions such as CRUE, CSIC¹³, and, of course, ANECA, which signed both agreements on April 3, 2023. The immediate consequence is a global redesign of all evaluative practices in its different competencies (accreditations, tenure, etc.). Without mincing words, this new change of direction in Spanish scientific policy was announced on ANECA's website (Table 3).

2. THE NARRATIVE CV

At this pivotal moment, the question arises about what tools will be available for evaluators. One of the significant changes brought by these new evaluation systems is the implementation of the Narrative CV, a philosophy primarily supported by DORA and already beginning to be adopted by many institutions, albeit in a quite heterogeneous manner. An example is the Spanish National Research Agency, which requests it from Principal Investigators (PI) in their research project evaluation processes, through the Abbreviated Curriculum Vitae.

This approach aims to move beyond extensive listings of publications and merits. According to DORA's website, these narrative curricula promote a "quality over quantity" mindset in the evaluation of academic careers, reducing the emphasis on journal-based indicators and adapting to non-linear research trajectories. Thus, narrative CVs aim to minimize the role of journal prestige in the evaluation of candidate profiles. The underlying idea is to allow individuals to more effectively demonstrate their contributions to research, teams, and society at large. Currently, the implementation of these curricula varies and is adapted to each organization, resulting in multiple versions.

However, one of the most popular is known as the Royal Society's *Résumé for Researchers* (R4R), a flexible narrative CV template designed to present a wider range of skills and experiences inspired by the "*Résumé for Researchers*"¹⁴ format, introduced by the Royal Society of London in 2019. R4RI¹⁵ combines elements of a CV and a cover letter, providing space to explain the context of academic achievements, allowing research staff to present relevant skills and experiences including mentoring and leadership, committee membership, outreach activities, and other contributions that do not always result in publications.

Another example of this new format can be found in the Swiss National Science Foundation¹⁶, initially piloted in 2020 for research in medicine and biology, the curriculum includes eight sections and asks research staff to present four 200-word narratives describing their most significant contributions to science. Thus, it is suggested that these new curriculum formats could promote greater diversity and inclusion in science since narratives would allow scientists to better explain their achievements and contributions to science, especially when they do not fit into traditional resume categories.

Therefore, the adaptation and implementation of the narrative CVs proposed by DORA fall to the institutions, although all follow a common line. It is relevant to highlight that the global

¹³ CoARA approves Crue's reform proposal: ANECA and CSIC for Spain
<https://www.crue.org/2023/07/coara-aprueba-la-propuesta-de-reforma-de-crue-aneca-y-csic-para-espana/>

¹⁴ <https://royalsociety.org/topics-policy/projects/research-culture/tools-for-support/resume-for-researchers/>

¹⁵ The R4RI template includes a total of four modules: 1) Contributions to the generation of new ideas, tools, methodologies, or knowledge, 2) Development of others and maintenance of effective working relationships, 3) Contributions to the broader research and innovation community, and 4) Contributions to wider audiences and users of research/innovation and towards a broader social benefit. Applicants can provide additional details relevant to their application in a separate section. The complete template of this CV can be consulted at: <https://www.ukri.org/publications/resume-for-research-and-innovation-r4ri-template>

¹⁶ <https://www.snf.ch/en>

281 adoption of these new curriculum formats presents various challenges. One of them is the
 282 lack of homogeneity, an aspect against which DORA suggests the need for standardisation.
 283 Furthermore, it points out the importance of training both users in their preparation and
 284 reviewers in their interpretation. Hence, it proposes developing a common and flexible
 285 definition of the narrative CV that is adaptable to different organizational contexts. For
 286 professionals dedicated to evaluation and to the creation of tools that facilitate this
 287 standardisation, we face what we call the "metric challenge." This challenge involves
 288 overcoming the dependence on the JIF and introducing metrics that strictly adhere to the
 289 framework and rules established in manifestos and declarations. Following DORA's
 290 guidelines, organizations may employ quantitative indicators, including bibliometric
 291 indicators, as long as they comply with the conditions indicated in Table 4.
 292
 293
 294

Table 4. Conditions for the Use of Indicators and Metrics According to DORA

| | | |
|--|--|-------------------------|
| 1 | 2 | 3 |
| Minimize the role of the prestige of scientific journals | Privilege the quality and nature of achievements over quantification | Use metrics responsibly |

295
 296
 297 This provides institutions and applicants with the freedom and opportunity to complement the
 298 defense of their merits in a robust and reasoned manner, using metrics and indicators
 299 subordinate to other types of narratives. Precisely, it is in this last challenge that Narrative
 300 Bibliometrics comes into play, which we will define next as a framework for the use of
 301 quantitative indicators conveniently described as a complement to other narratives.
 302

303 Contrary to what is sometimes maintained, the narrative CV is not entirely foreign to the
 304 Spanish framework. Specifically, in evaluative processes such as tenure evaluations and
 305 accreditations, free text spaces are used for applicants to develop the narrative of their
 306 research careers (as in the PEP program¹⁷ and the previous ACADEMIA format), their
 307 research merits or any other type (the current ACADEMIA), or about specific merits
 308 (Sexenios¹⁸ and ACADEMIA). In the same vein, applicants for projects from the National Plan
 309 have traditionally been able to narrate the main merits of the research teams, all of which
 310 can include the use of metrics. Therefore, we are moving in familiar territory, and what we do
 311 in this text is simply to name and systematize some common practices that have already
 312 been taking place in Spanish academia.
 313

3. NARRATIVE BIBLIOMETRICS

314
 315 Given its conceptual simplicity, Narrative Bibliometrics can be defined as "the use of
 316 bibliometric indicators to generate stories and narratives that allow for the defense and
 317 exposition of a scientific curriculum and/or its individual contributions within the framework of
 318 a scientific evaluation process" (Torres-Salinas, 2023). Thus, we are talking again about a
 319 type of Bibliometrics that is instrumental in nature, essentially acting as a support or aid for
 320 the generation of specific quantitative narrative aimed at a detailed and responsible
 321 exposition of evidence and indications related to the impact, attention, dissemination, and
 322 influence of any type of scientific results. Due to its inherent characteristics, Narrative
 323 Bibliometrics must necessarily be framed within the theoretical and practical corpus of

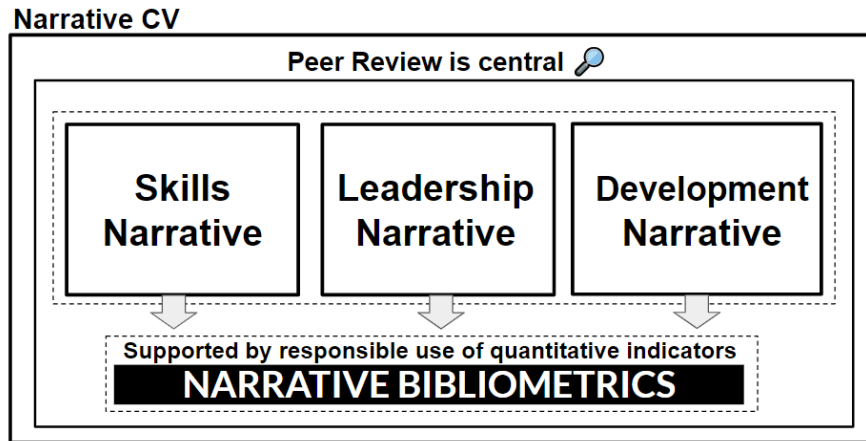
¹⁷ The PEP is a program by ANECA aimed at evaluating the teaching and research performance of university faculty members in Spain.

¹⁸ A sexenio is a six-year period used in Spain to assess the research activity of university professors for rewards and promotion.

324 Evaluative Bibliometrics, which implies adherence to and respect for the five fundamental
 325 principles previously exposed.
 326

327 This means that the information provided by bibliometric narratives must facilitate decision-
 328 making in scientific policies, such as hiring, promotions, and salary supplements. Moreover,
 329 these narratives are subordinate to expert judgment and serve as support for other forms of
 330 narrative (Figure 1).
 331

332 **Figure 1.** The integration of Narrative Bibliometrics in the framework of narrative curricula
 333 established by DORA is subordinate to other narratives and under the supervision of Peer
 334 Review



335
 336
 337 From a methodological perspective, bibliometric narratives must consider the diverse
 338 contexts of both the evaluative framework and the subject evaluated. It is essential that they
 339 have a multidimensional character, avoiding an exclusive focus on journal indicators or
 340 citations. Lastly, the information provided must be transparent and verifiable, thus ensuring
 341 its reliability and usefulness in the evaluation process. Therefore, Narrative Bibliometrics is
 342 a younger sibling of Evaluative Bibliometrics, whose main goal is to offer practical solutions
 343 in new evaluative procedures.
 344

345 What exactly does Narrative Bibliometrics entail? It can be described as the 'Bibliometrics of
 346 common sense', where raw data is given meaning in a logical manner. That is, it is a narrative
 347 that encourages researchers to analyze and contextualize each indicator, avoiding their
 348 isolated and disconnected presentation. This moves away from what has traditionally been
 349 known in Evaluative Bibliometrics as bean counting, a term referring to the decontextualized
 350 application of indicators (Rafols and Stirling, 2021). While descriptive Bibliometrics has
 351 historically been a data-driven discipline, our proposal moves towards an understanding of
 352 bibliometric data, recognizing that numbers alone cannot fully capture the value and
 353 importance of scientific research.
 354

355 In a sense, by promoting a narrative of what happens behind the data, Narrative Bibliometrics
 356 avoids the simplification involved in merely presenting a bibliometric indicator. Moreover, it
 357 can help to prevent problematic behaviors in academia, such as the manipulation of
 358 indicators or high rates of self-citation.
 359

360 Within the framework of Narrative Bibliometrics, it is crucial to establish principles that
 361 guarantee not only the quality and relevance of the analysis but also its replicability and
 362 adaptability to different academic contexts. These narratives must go beyond mere data
 363 presentation, incorporating elements that ensure a comprehensive understanding of the
 364 scientific contribution. For this purpose, it is essential to consider key aspects such as the

clarity of sources, the uniqueness of contributions, adaptation to the specific field of study, appropriate contextualization, and avoiding direct comparisons with other colleagues. These recommendations are developed in detail below (Table 5).

Table 5. General considerations for conducting Bibliometric Narratives

| Replicability | Uniqueness | Adaptability | Comparability | Contextuality |
|---|--|---|---|---|
| The bibliometric narrative requires a clear and precise description of methodologies and sources. This allows other researchers to replicate the studies and reach similar conclusions. | The narrative should reflect the individual contribution or the specific impact that one wishes to highlight uniquely. Despite similar contributions, the specificity of each contribution should be emphasised. Therefore, the same contribution could be defended in different ways. | The narrative must adapt to the particularities of each field, considering the differences in publication, citation, and collaboration practices that vary between disciplines. Thus, global and uniform indicators and narratives do not apply to all areas. | Narratives should focus on highlighting individual achievements and contributions without making direct comparisons with other colleagues. This promotes an evaluation based on one's own merits and avoids creating an environment of undue competition. | The narrative must place the data and achievements in a broader context. This includes explaining the relevance of the work within the field of study, its impact on the scientific community and society, and how it relates to current research trends. |

4. THE NARRATIVES

There are various ways to construct and understand narratives derived from bibliometric indicators, many of which may overlap and must be combined appropriately to create an effective discourse and defense.

Below, we explore five key examples of these narratives, each providing a unique perspective. These examples range from the Narrative of Position, which contextualizes contributions within a broader framework, to the Narrative of Open Science, highlighting proactivity in the dissemination of scientific work. These perspectives enrich bibliometric data and offer a more comprehensive view of the impact of scientific work. It is important to mention that the narratives presented focus on individual contributions or articles. Additionally, it should be noted that curricula vitae (CVs) often have a character limit, implying the need for effectively synthesizing the message for the evaluating personnel.

- Narrative of position:** Provides an essential comparative perspective to position a scientific contribution relative to others. This narrative relies on the use of normalized indicators, such as the Category Normalized Citation Impact (CNCI) or the Field Weighted Citation Impact (FWCI), which evaluate the impact of a publication compared to other works in the same field, year, and document type. These indicators are particularly valuable as they offer an analysis adjusted to the specificities of each discipline (Torres-Salinas et al., 2018). Furthermore, the utility of these indicators extends when bibliographic databases provide the position of an item in a collection, considering quartiles and percentiles, translating into a significant measure to determine the relevance of a publication within its specific field. This narrative approach is especially valuable for highlighting the position of research through various indicators, whether citation, usage, among others, thereby underlining its importance and relative contribution in the scientific field. Metrics referring to the average number of citations available in products like Essential Science Indicators, Hot Papers, and Highly Cited Papers could also be included in this category.

✓ *Despite its recent publication, our proposal is receiving significant attention from the scientific community, and the study indexed in Scopus under the thematic category of "Environmental*

Sciences" has 40 citations, thus significantly exceeding the average of 10 citations typically expected for publications in this category in 2021. Therefore, it quadruples the citation expectations in its field. Applying the Field-Weighted Citation Impact (FWCI) indicator, which contrasts received citations with those expected, results in an FWCI of 4, thus evidencing the exceptional impact of the work in the area of Environmental Sciences.

- **Narrative of context:** Emphasizes the relevance of the environment and place in which the publications have been cited, offering an enriching perspective on the application and practical utility of scientific works. By conducting a detailed analysis of the locations and modes in which our works are mentioned, a detailed narrative about their theoretical and practical impact can be developed. This approach allows discerning, for example, if a study is having a significant influence on the development of theoretical debates or the evolution of methodologies through the classification of citations according to article sections (e.g., introduction, methodology, discussion). Such distinction is of utmost importance for evaluating personnel, as it provides a deeper and more nuanced understanding of the scope and relevance of research. Contextual metrics, integrated into platforms like Web of Science or the *_scite*¹⁹ database, can be effectively employed for a more comprehensive assessment of academic impact (Orduña-Malea, 2022).
- ✓ *Our work has received 30 citations. Consulting *_scite*, we find that 5 citations are in the introduction, 5 in methodology, and 20 in the discussion. This indicates that the work has generated some interest, being used as a basis for contrasting results in other publications. For example, Braun (2023) states that 'our results corroborate the values reached for gene sequencing in diverse populations by Torres-Salinas, which means that their method is valid for comparative genomic studies and opens the doors to multiple applications in personalized medicine and the analysis of genetic patterns at a population level.*
- **Narrative of agents:** Focuses on identifying, describing, and characterizing the different actors, both individual (authors) and collective (groups) and institutional (organizations), that use and employ the results of our work. Providing a detailed analysis of who is applying the knowledge derived from our research gives a clear and objective view of its real impact. This perspective is fundamental to understanding the nature of the impact generated, whether educational, social, economic, or otherwise. Tools like Overton²⁰, for example, offer the ability to track the use of a publication in globally relevant policy reports, such as situation reports from the World Health Organization (WHO) or strategic documents from the European Union. This narrative, therefore, not only allows an understanding of the influence of our publications in various contexts outside the scientific ecosystem.
- ✓ *Our publication "The spread of true and false news online" has had a wide dissemination in different impacts to the scientific community as it is referenced in 26 policy reports such as the "OECD Public Governance Policy Papers" (OECD), the "Key social media risks to democracy" (Publications of the European Union), or the "Online Safety Bill: supporting documents" (gov.uk). Therefore, our recommendations on the evaluation of fake news are being applied for the design of public policies and the creation of guides. The indicated information can be verified in the Overton database. Moreover, it has not only had a political influence but also transferred knowledge to the technological field as demonstrated by the four mentions from patents registered in the United States (US-11636679-B2, Grant US-11494446-B2, Grant US-11176380-B2, Grant US-10691951-B1), information that can be quickly verified through the Dimensions database.*
- **Narrative of audience:** Focuses on the potential reach (audience) of findings across different audiences. Unlike the narrative of agents, which makes use of and mentions our publications in other texts, the audience narrative specifically focuses on the reception of our work and its filtering in various ways. It is crucial not only to quantify but also to qualify

¹⁹ <https://scite.ai/>

²⁰ <https://www.overton.io/>

the recipients of our research. In the context of the press, for instance, it is important to consider both the media outlets involved and their audiences, taking into account their reach (local, national, international). On digital platforms like Twitter, not only the volume of mentions is relevant but also the potential reach of these, considering the number of followers of those who interact with the content. The detailed identification and description of the audience profile, whether scientific or media, adds a crucial dimension to the impact analysis. This approach has been discussed by Arroyo-Machado and Torres-Salinas in 2023, highlighting its importance on platforms like Twitter or Wikipedia.

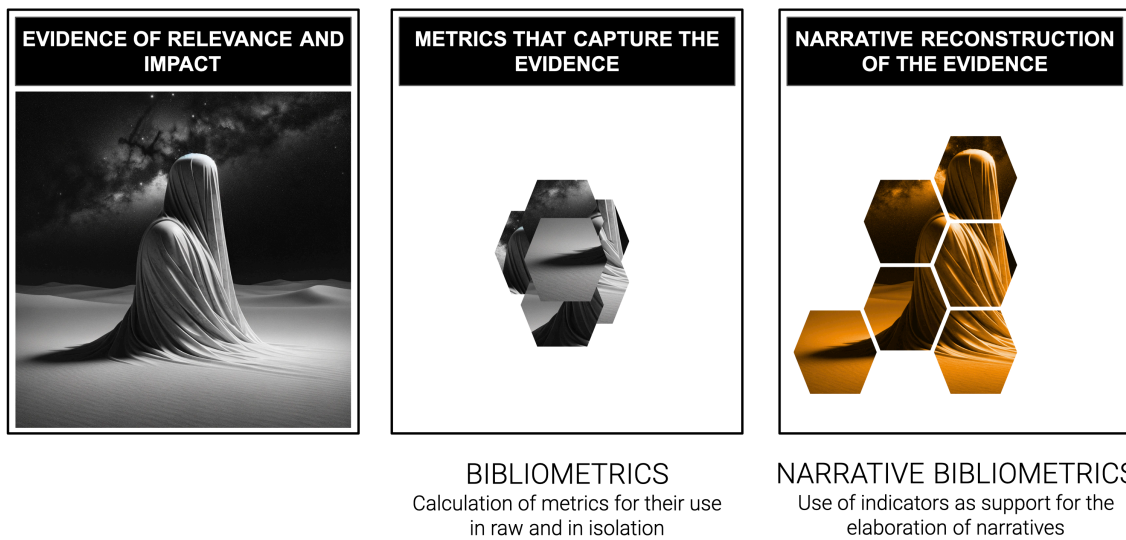
- ✓ *The results of our study on adolescent mobile phone use were disseminated on Twitter to inform various associations, professionals, and colleagues. The work was retweeted 65 times, and according to Twitter, the total tweet impressions were 10,100. It's worth mentioning that 40% of the interactions came from institutional accounts such as @JovenesSaludables, @PrevencionAdol; some scientific societies also echoed it, like @SocPediatria, @CienciaAdolesc, and @PsicoEducaJoven. In the comments from various institutional accounts (for example, @InstFamiliaAdol, @EducaSalud), they mention that the protocols on youth well-being and digital risk prevention are reinforced by our findings. Furthermore, as a result of this dissemination, we were contacted by the EducaDigital Association to offer a virtual course on effective strategies for responsible mobile phone use by adolescents.*
- **Narrative of Open Science:** This narrative highlights the research personnel's proactivity in disseminating their work on open platforms. It primarily focuses on indicating whether, on the one hand, publications have been deposited in open access in institutional or thematic repositories (for example, the University of Granada has DIGIBUG, and at the European level, we recommend Zenodo). These narratives can be accompanied, where appropriate, by the repositories' usage data. On the other hand, it focuses on indicating whether the preprint version was deposited and disseminated prior to publication, or if the data derived from our publications (datasets, software) have been deposited in open access. Beyond mere deposit, it can be indicated if the description and deposit of these data have been carried out according to certain standards (for example, the FAIR principles²¹). In addition to the mentioned usage indicators, indicators on file size, shared volume, etc., can be offered. In all cases, it is advisable to accompany the records with persistent identifiers (DOI, handle, etc.) for correct identification.
- ✓ *Our recent article on learning algorithms has been disseminated in pre-print format in the Digibug (handle 10.5430/DGB.2023.056AB) and Zenodo (DOI 10.5281/zenodo.789123) repositories. Additionally, the study's supplementary materials are available on FigShare (DOI 10.2132.3232/fig2224). Among these, Supplementary Document 1 (DOI:10.1234/SCI2S.2023.001), offering detailed precision results for each classification method, and Supplementary Document 2 (DOI:10.1234/SCI2S.2023.002), with the Wilcoxon test results, stand out. These documents, with more than 5400 combined downloads (3723 from the United States, 1200 from the United Kingdom), have generated significant interest in the academic field.*
- ✓ *The datasets from our study on machine learning algorithms, hosted on DataSphereX under the identifier IX:10.DSX/2023/DATA01, comprise approximately 500 GB of information distributed over more than 2 million rows and 100,000 columns. With over 3000 downloads, these data have been fundamental in cross-disciplinary research, complying with the FAIR standards for scientific data management and use. For example, in educational psychology, they have been reused in the study "Impact of Machine Learning on Educational Assessment" (DOI:10.5555/edu-tech.2023.004), analyzing 200,000 rows to discover learning patterns. In communication sciences, they enriched the analysis in "Social Networks and Informational Behaviour" (DOI:10.5555/com-sci.2023.010), and in public health, they contributed to "Big Data Analysis for Disease Prevention" (DOI:10.5555/pub-health.2023.021). This interdisciplinary reuse demonstrates the applicability and relevance of the data, highlighting the importance of sharing open and accessible information to foster scientific collaboration and knowledge advancement.*

²¹ There are tools that automatically validate the compliance of a digital object (dataset) with the FAIR criteria on a pilot basis, such as F-UJI (<https://www.f-ujl.net>).

512
513 **5. METHODOLOGICAL FRAMEWORK**

514 narrative Bibliometrics, as an evolution of traditional Bibliometrics, adopts a more holistic and
515 contextual approach to evaluating scientific research. This method transcends the use of a
516 limited set of indicators, focusing on detailed argumentation that highlights multiple
517 dimensions of research. Indicators act as tools within a broad interpretative framework that
518 seeks to comprehensively understand the relevance and impact of research. By
519 incorporating the stories and contexts underlying the data, Narrative Bibliometrics promotes
520 a deeper and more nuanced understanding of academic work, encouraging more complete,
521 thorough, and granular evaluations. It involves being able to identify activity and impact in
522 works that have followed unconventional paths, but are not necessarily of lesser value
523 (Figure 2).
524
525

Figure 2. Narrative Bibliometrics as a process of reconstructing the evidence



526
527
528 In the following sections of the methodological section, we will describe the tools that will
529 allow us to construct our narratives, focusing both on indicators and information sources.
530 Although there is a wide range of both, it is crucial to recognize that not all indicators are
531 meaningful and not all sources are suitable for constructing narratives aligned with the
532 recommendations of Table 5. Our intention is not to provide an exhaustive list, which would
533 be materially impossible, but to select the most representative indicators and sources and
534 explore how we can use them effectively.
535

536 **5.1. Bibliometric indicators**

537 one common argument in manifestos like those of Leiden and DORA is the problem of basing
538 decisions solely on one indicator. Against this, the use of multiple indicators that provide a
539 broader and more detailed view of what is being evaluated is recommended. Indeed, this
540 claim is not new. It is necessary to bear in mind that, far from seeking a perfect indicator
541 adaptable to any scenario, it is crucial to properly understand the different indicators,
542 especially their limitations. The key lies in integrating them, overcoming their potential
543 deficiencies, rather than discarding them because of their limitations (Martin, 1996). This
544 integration allows for a balanced evaluation that more accurately reflects the complexity of
545 the phenomena evaluated.
546

547 Therefore, the focus should be on how different indicators can complement each other to
548 offer a more comprehensive overview, which in turn leads to more informed and effective
549 decisions. With the aim of providing as broad an image as possible of the influence and

550 impact of a publication, we can establish a distinction between four basic dimensions for the
551 different indicators to be used in Narrative Bibliometrics:

- 552
- 553 ● **Scientific impact:** This dimension focuses on measuring the relevance and influence that
554 a publication has within the scientific community. It uses metrics based on the number of
555 times the work is cited in other academic works, providing a direct reflection of both the
556 attention and usage it is receiving from the community.
- 557 ● **Relevance of the medium:** This dimension pays attention to the environment in which
558 the work is published, considering both quantitative and qualitative aspects. Quantitative
559 criteria derive from the scientific impact of its publications, while qualitative criteria address
560 editorial policies and the quality of the medium, reflecting the importance of context in the
561 valuation of the publication.
- 562 ● **Social attention:** This dimension addresses the dissemination of the publication in social
563 media based on mentions it receives on digital platforms and conversations on social
564 networks, thereby reflecting attention from agents who may be outside academia.
- 565 ● **Usage and visibility:** This dimension concentrates on the accessibility and reach of the
566 publication in the digital world through metrics that directly address the usage of the work
567 and the traffic generated by it. This provides a reflection of the access and reach of the
568 publication.
- 569

570 The selection of indicators in Table 6 brings together the main quantitative metrics to support
571 Narrative Bibliometrics and covering the four dimensions. However, this is a starting point.
572 Beyond integrating metrics into a narrative and giving it coherence, it is sometimes necessary
573 to explore and dissect the values behind them to better understand the scope of the
574 publication and provide greater context to the metrics derived from it. A method that is
575 particularly relevant for deeply understanding the audiences and agents paying attention to
576 our work.

577

578 It is also fundamental to recognize that all indicators are constructions that closely depend
579 on specific contexts, that is, on the sources in which they are elaborated. With the rise of
580 scientometric information sources, ranging from databases and search engines to altmetric
581 data aggregators, the options have multiplied and diversified. A clear example of this
582 evolution is that, before the end of the 20th century, Web of Science (then known as Web of
583 Knowledge) was practically the only citation database. However, since then, we have
584 witnessed the emergence of dozens of databases (Gusenbauer, 2022) with OpenAlex as the
585 most recent and relevant novelty (Priem et al., 2022). This has resulted in a diversity of
586 indicators, common and specific to each source, all dependent on the sources on which they
587 are calculated. The inherent advantages and limitations of these tools are transferred to the
588 indicators they produce. Although such proliferation is positive, as it offers customized and
589 accessible solutions for users, it also constitutes significant risks for Bibliometrics, and
590 particularly Narrative Bibliometrics.

591

Table 6. Main/selected indicators and useful sources for their use

| Dimension | Indicators | Sources | Type | Interpretation |
|--------------------------------|---|---|------------------|---|
| SCIENTIFIC IMPACT | Total citations | WoS / Scopus / Dimensions / Dialnet Métricas / GS | Raw indicator | Total number of times a publication is referenced by others |
| | Total citations (excluding self-citations) | WoS / Scopus / Dialnet Métricas | Raw indicator | Total number of times a publication is referenced by others, excluding any by the authors themselves |
| | Normalized citations | WoS / Scopus / Dimensions / Dialnet Métricas | Normalized value | Difference between the number of citations and the global average for publications with similar characteristics |
| | Citation percentile | InCites / Scopus / Dialnet Métricas | Normalized value | Position of the publication in terms of citation numbers compared to others in its field |
| | Reviews | Dialnet | Raw indicator | Total number of times a book is reviewed |
| RELEVANCE OF THE MEDIUM | Journal impact | JCR / SJR / Scopus / IDR | Raw indicator | Impact measure based on the citations received by the publications within a time window |
| | Journal percentile | JCR / Scopus / IDR | Normalized value | Position of the journal in terms of citation numbers compared to others in its field |
| | Journal quartile | JCR / SJR / Scopus / IDR | Normalized value | Quartile position of the journal in the impact ranking of its field |
| | Journal ranking | JCR / SJR / Scopus / IDR | Raw indicator | Position of the journal in the impact ranking of its field |
| SOCIAL ATTENTION | Social media mentions | Altmetric.com / PlumX | Raw indicator | Total number of times a publication is mentioned on a social network |
| | News mentions | Altmetric.com / PlumX | Raw indicator | Total number of times a publication is referenced in digital press |
| | Mentions in policy reports | Altmetric.com / PlumX | Raw indicator | Total number of times a publication is referenced in public policy reports |
| | Wikipedia mentions | Altmetric.com / PlumX | Raw indicator | Total number of times a publication is referenced in Wikipedia articles |
| USAGE AND VISIBILITY | Mendeley readers | Mendeley / Altmetric.com / PlumX | Raw indicator | Total number of Mendeley users who have added the publication to their library |
| | Academic links | Altmetric.com / PlumX | Raw indicator | Total number of times a publication is referenced on curated academic websites |
| | Downloads | Web analytics tools | Raw indicator | Total number of times a publication has been downloaded |
| | Presence in libraries | REBIUN / WorldCat | Raw indicator | Total number of libraries that have the book in their catalog |

592

5.2. The sources









As varied as the indicators are, so too are the sources from which they derive. In addition to the clear explosion in bibliographic database sources, the main source of information for this type of data, there has also been a diversification in bibliometric data products. With this, we can establish the following classification of sources for obtaining metrics (Table 7 and Table 8).

Table 7. Classification of bibliometric information sources

| | |
|--|---|
| <p>Bibliographic reference and citation databases</p> <p>Traditional platforms specialized in the collection and organization of bibliographic references of scientific publications and their citations. <i>For example, Web of Science and Dialnet.</i></p> | <p>Search engines</p> <p>Platforms that allow for searching academic and scientific literature across the Internet. <i>For example, Google Scholar and PubMed.</i></p> |
| <p>Data aggregators</p> <p>Specialized platforms that compile and integrate data related to scientific publications. <i>For example, Altmetric.com and PlumX.</i></p> | <p>Indexes</p> <p>Tools that provide curated lists of journals and books including detailed information. <i>For example, Journal Citation Reports and DOAB.</i></p> |
| <p>Combined sources</p> <p>These platforms combine more than one source at the same time, especially bibliographic databases and data aggregators. <i>For example, Dimensions+Altmetric.com and Scopus+PlumX.</i></p> | <p>Open Access Repositories</p> <p>Digital platforms that store and allow access to academic works in open access, including thematic repositories specialized in specific areas and institutional repositories. <i>For example, Zenodo.</i></p> |
| <p>Bibliometric suites</p> <p>Highly specialized tools focused exclusively on bibliometric and scientometric analysis. <i>For example, InCites and SciVal.</i></p> | <p>Complementary sources</p> <p>A variety of resources not focused on academic literature but through which it interacts. <i>For example, WorldCat and Wikipedia.</i></p> |

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Table 8. Main information sources and their bibliographic and metric characteristics

| SOURCE | TYPE | BIBLIOGRAPHIC CONTENT | | | | METRICS | | |
|---|------------------------|----------------------------|--|-----------------|-------------------|--------------------|----------------------|--------------------|
| | | DOCUMENTARY SPECIALIZATION | THEMATIC SPECIALTY | LINGUISTIC BIAS | METADATA CURATION | METRICS LEVEL | IMPACT TYPE | NORMALIZED METRICS |
|  Clarivate Web of Science™ | Bibliographic database | Articles | Natural and Physical Sci. Health and Technology | English | High | Document | Scientific | No |
|  Dialnet | Bibliographic database | Articles Books | Social Sciences Humanities | Spanish | Normal | Document Medium | Scientific | No |
|  Scopus® PLUMX | Combined source | Articles | Natural and Physical Sci. Health and Technology | English | High | Document Medium | Scientific Social | Yes |
|  Dimensions Altmetric | Combined source | Articles | Natural and Physical Sci. Health and Technology | English | Normal | Document | Scientific Social | Yes |
|  Clarivate InCites™ | Bibliometric suite | Articles | Natural and Physical Sci. Health and Technology | English | High | Document Medium | Scientific | Yes |
|  Dialnet métricas | Bibliometric suite | Articles Books | Social Sciences Humanities | Spanish | Normal | Document Medium | Scientific | Yes |
|  Clarivate Analytics Journal Citation Reports | Index | Journals | Natural and Physical Sci. Health and Technology | English | High | Medium | Scientific | Yes |
|  OCLC WorldCat® | Complementary source | Books | Social Sciences Humanities | Multilingual | Normal | Document | Social | No |

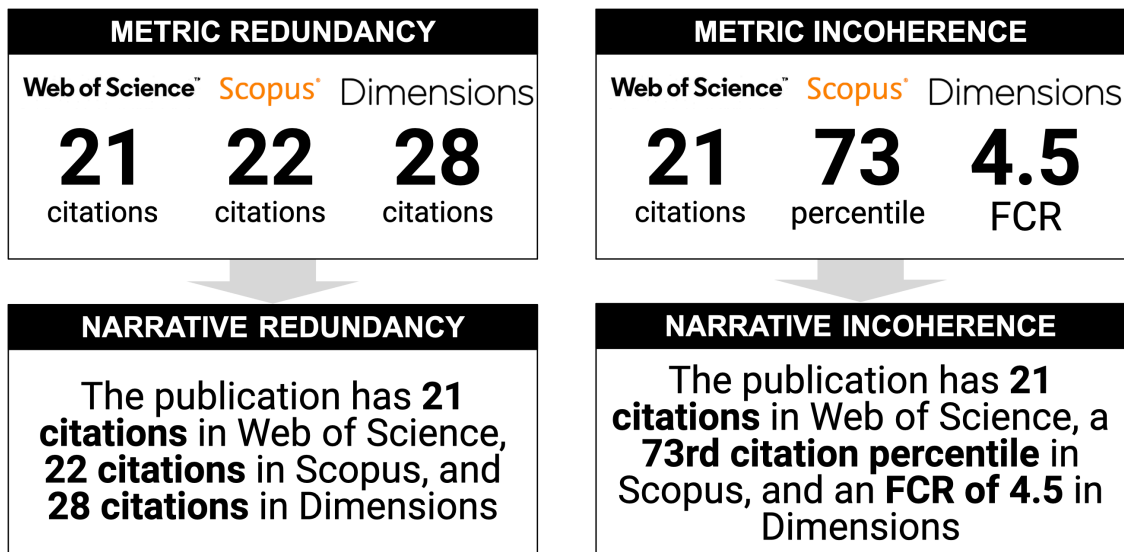
605

6. FROM METRICS TO NARRATIVE

In developing these narratives, the primary risk is turning the diversity of metrics and sources into a marketplace rush for the best offer to craft persuasive narratives. Narrative Bibliometrics should always be a process that moves from evidence to indicators, not vice versa. It must be handled with caution to avoid mixing elements that, far from complementing each other, deepen the same message. Here lies two very common risks: redundancy and incoherence (Figure 3).

The first has to do with the obsession with metrics (Muller, 2019), leading to their excessive use and lack of true relevance, often reiterating the same message. The second is more severe, as it involves constructing a Frankenstein with completely decontextualized indicators that cannot be jointly interpreted. This phenomenon occurs when metrics that only make sense within their original context or specific database are mixed as part of a whole. The key, therefore, is to use metrics in an informed and contextual manner, recognizing their limitations and avoiding falling into the trap of overinterpretation, underinterpretation, or misinterpretation.

Figure 3. Main problems of redundancy and incoherence in narrative bibliometrics



Once we have the necessary metrics, it is time to exploit the evidence reflected by the metrics by constructing narratives. Table 9 presents various examples showing how exhaustive narratives can be established from specific indicators collected in Table 6, contextualizing such indicators and highlighting their value.

Narrative bibliometrics also offers us the possibility to explain and justify the decisions we have to make for the calculation of our indicators, and how they can affect the retrieved values. Moreover, a science like bibliometrics that is mainly based on statistics should always indicate the validity of its values, both of its figures as well as of its decimals, if they have any significance.

For example, it would be very necessary to “narrate” how the values obtained for the calculation of the normalized citation indicators, such as the CNCI or the percentiles, would be affected by the decision we have taken by 1) selecting a particular classification scheme, 2) selecting one classification schema based on journal level or on document level; and 3) using the selected classification schema on a particular aggregation level (macro, meso or

micro). Actually, for the bibliometrician community, it is crucial to be able to estimate the effect that these decisions are expected to have on the values calculated for their impact measures. The errors that can be made in the calculations of our bibliometric indicators when making decisions about the type of documents to be analysed or the type of classification chosen have been recently analysed and discussed (see Robinson et al, 2023). The authors conclude that their findings underscore the importance of responsible metric use in research evaluation, providing valuable insights for both bibliometricians and consumers of such data. Narrative bibliometrics would be the ideal instrument to undertake such an arduous but necessary task.

Table 9. Examples of common indicators and their linked narratives for the defense of scientific contributions within the framework

| Indicator | Narrative |
|---|---|
| <p>Total Citations (with and without self-citations)</p> <p>Evidence Scientific impact</p> | <p><i>The contribution has been widely recognized in the scientific community, as demonstrated by its impact in the Web of Science Core Collection with a total of 40 citations, highlighting the absence of significant self-citations. Among the European and Spanish institutions that have cited this work are Stanford University with 9 citations, the University of Milan with 6, and the University of Barcelona, each contributing 5 citations. The research has also caught the attention of organizations like the Karolinska Institute (4 citations) and the Spanish National Research Council (CSIC) with 3 citations. Its interdisciplinary nature is reflected in citations from areas such as "Genetics and Heredity" (12 citations), "Pharmacology and Toxicology" (8 citations), and "Public and Environmental Health" (6 citations). Additionally, its relevance is evidenced by how it has been predominantly cited in the results sections (10 citations) and methodology (5 citations) in related literature, underscoring its impact on the formulation of new research and the interpretation of scientific data.</i></p> |
| <p>Category Normalized Citation Impact (CNCI)</p> <p>Evidence Scientific impact</p> | <p><i>The work, indexed in the thematic category of "Nutrition and Dietetics", has shown a significantly higher impact than the average in its field. With a total of 28 citations received, this study stands out notably compared to the average number of citations expected for works of similar category and publication year. For the year 2021, the expected citation figure for an average work in the "Nutrition and Dietetics" category is 8.10. Comparing this average with the 28 citations obtained by our work, it shows exceptional performance, almost tripling the number of citations that would normally be expected for an article in this thematic category. The Category Normalized Citation Impact (CNCI) quantifies this observation. It is calculated by dividing the total number of citations received by the number of expected citations, in this case, 28 divided by 8.10, resulting in a CNCI of 3.46. This value underscores that the work has not only met but significantly exceeded citation expectations, placing it in a prominent position within its thematic area.</i></p> |
| <p>Percentile</p> <p>Evidence Scientific impact</p> | <p><i>This article on deep learning and its application in complex pattern recognition, published in the "Journal of Artificial Intelligence Research", has to date accumulated 150 citations. It has reached a high 97th percentile in Scopus in the "Artificial Intelligence" category, meaning it is above 97% of publications in citations or in other words, in the top 3% of the most cited publications in its area in the year of its publication, highlighting its impact in such a competitive field. Notably, the low value of self-citations, only 5% of the citations, underscores the quality and independent relevance of the research. This article has been cited by various leading institutions, including MIT and Stanford University, reflecting its broad acceptance and recognition in the global scientific community. Among the citations received, 30 come from articles focused on computational neuroscience, demonstrating its interdisciplinarity and the wide range of applications of its findings.</i></p> |
| <p>Reviews</p> <p>Evidence Scientific impact</p> | <p><i>The book has been the subject of three distinguished critical reviews compiled in Dialnet. These reviews were carried out by experts in European history, including Dr. Alberto Ruiz from the University of Heidelberg, Dr. María López from the Sorbonne University, and Dr. Giuseppe Conti from the University of Rome. Dr. Ruiz in his review emphasizes: "This work redefines our understanding of the Renaissance, masterfully integrating cultural, political, and social perspectives." Dr. López, for her part, highlights: "Fernández not only offers a captivating narrative but also a profound critical analysis, establishing new paradigms in Renaissance studies." These evaluations highlight the analytical depth and unique contribution of the book to historical knowledge, underlining its significance in academia.</i></p> |

| | |
|--|--|
| <p>Journal Impact Factor (JIF)</p> <p>Evidence Medium relevance</p> | <p>The article published in "Scientometrics" presents a unique case, being indexed in the Journal Citation Reports in both Information Science & Library Science (ISLS) in the SSCI and Computer Science, Interdisciplinary Applications in the SCIE. The JIF of the journal in the year of the article's publication, according to the Journal Citation Reports, was 4.5 in 2022, the year the article was published. This JIF is calculated based on the division of the total number of citations in the year for articles published in the two previous years, 3249 citations, by the total number of publishable articles in those years, 831, reflecting the most recent impact of its publications. The journal <i>Scientometrics</i> is the oldest in our field and was founded in 1978 by Tibor Braun, currently edited and managed by Springer and has been continuously indexed in the Social Science Citation Index since then.</p> |
| <p>Journal Quartile and position</p> <p>Evidence Medium relevance</p> | <p>The manuscript was submitted to this journal due to the progression and good impact it has achieved over the last few years, making it a reference journal in its field as shown in Figure 1. It can be seen that in the year of the work's publication, it was in position 28 out of 70 in the CHEMISTRY ANALYTICAL category. Following 2007, the journal began an ascent in its impact and scientific influence, reaching the first quartile by 2009 (position 17 out of 70) and has been indexed uninterruptedly in the same since 2011. Since 2013, it has also always been among the top ten journals in CHEMISTRY ANALYTICAL. Therefore, we are looking at a journal well regarded by the scientific community as evidenced not only by positional indicators but also by the excellent evolution of its Impact Factor: 2016 Position 8 out of 83 (IF=7.803), 2015 (IF=6.764), 2014 (IF=5.538), 2013 (IF=5.463), 2012 (IF=4.743), 2011 (IF=4.182), 2010 (IF=3.609), 2009 (IF=3.184).</p> |
| <p>Social media mentions</p> <p>Evidence Social attention</p> | <p>A study on innovative therapies for cardiovascular diseases, published in the "Journal of Clinical Medicine", has generated broad discussion on social media, reaching 190 mentions on Twitter and 78 on Facebook. Using Altmetric.com (geographical breakdown), it is observed that 60% of users from country X who shared the study are from countries outside the study's country of origin, including the United States, the United Kingdom, and Australia. Also, it indicates that the audience of the accounts mentioning us (demographical breakdown) corresponds mainly to the general public (45%) and scientific community (32%) with a small percentage (10%) of science communicators (journalists, bloggers, editors). On Facebook, through PlumX, it is noted that the mentions predominantly come from groups of health professionals and patients interested in medical advancements, 80% of the users, underscoring the practical relevance and reach of the study. Common phrases in the posts on both social networks include "significant advancement in cardiology" and "hope for patients with heart diseases", demonstrating the emotional and professional resonance of the study.</p> |
| <p>News mentions</p> <p>Evidence Social attention</p> | <p>This study on innovative therapies for cardiovascular diseases has captured the attention of the media. According to Altmetric.com, it has received a total of 30 mentions in 23 different media outlets in the last 11 months. Of the 30 mentions received, 75% of the media outlets are international, finding prestigious media such as "The Guardian", "CNN", and "The New York Times" highlighting the potential of the therapy to change the treatment paradigm for cardiovascular diseases. Some of these media have referred to our work as "Cardio Care Revolution: New Therapy to Alter Treatment Landscape" (Le Monde Digital, 27/05/2022) or "Transforming Heart Health: Novel Therapy Challenges Old Methods" (Reuters Online, 28/05/2022). These articles not only inform about the study but also contextualize it within the current challenges of medicine, offering perspectives from experts in the field and patients, increasing public understanding and interest in the research.</p> |
| <p>Policy report mentions</p> <p>Evidence Social attention</p> | <p>This study on the configuration of new urban spaces has been mentioned four times in public reports (policy documents), we want to highlight its mention in the reports "Delivering Climate Resilient Cities Using a Systems Approach" from the World Economic Forum (2022) which highlights our proposal with the phrase "One paradigmatic system-wide approach that has received significant interest during the COVID-19 pandemic is the "15-minute city"; it has also been mentioned in the "Reference Guide for Climate-Smart Public Investment" from the World Bank (2022) where it is noted "The '15-minute city' represents a magnificent and transformative urban development concept, foreseen as a pivotal model for the future of sustainable and efficient city living". We must note that some political parties are already incorporating some of their proposals into their political programs, for example, Más Madrid explicitly mentions our publication in their book "Madrid, city of the 15 minutes. This mention in reports is causing requests by seven provincial capitals in Spain for consultancy reports to analyze the feasibility of their cities to our proposal. The information is verifiable through Altmetric, PlumX, and Overton. Also, the reports are available in references 1, 2, 5, and 8.</p> |
| <p>Wikipedia mentions</p> | <p>Our work on Roman settlements in southern Spain, previously mentioned, has also been cited</p> |

| | |
|--|---|
| <p>Evidence <i>Social attention</i></p> | <p><i>in 8 Wikipedia articles. 50% are articles from the English edition of Wikipedia and the other half are 2 articles from the Spanish Wikipedia and 2 from the French Wikipedia. Its reference in the article "Roman settlements in Europe", which is approximately 6000 words long and has a content quality rating of C, thereby acknowledging the level of development of the article. This mention in Wikipedia not only increases the visibility of the study among the general public but also validates its relevance and accuracy in an educational and disseminative context.</i></p> |
| <p>Mendeley readers Evidence <i>Usage and Visibility</i></p> | <p><i>As recorded, the study has been added to the personal libraries of 250 users on Mendeley, with a detailed analysis revealing that approximately 40% of these readers are from the United States, followed by 20% from the United Kingdom and 10% from Germany. Nearly half of all readers are students (undergraduate, master's, and doctoral), highlighting its importance in educational contexts. Furthermore, 45% of the readers belong to the field of Health Sciences and 20% to Social Sciences. These data not only reflect the broad interest and relevance of the study but also demonstrate its interdisciplinary impact and its ability to attract a diverse audience of researchers and professionals in various health-related fields.</i></p> |
| <p>Academic links Evidence <i>Usage and Visibility</i></p> | <p><i>The publication has been mentioned on 25 academic websites. These include 20 renowned academic blogs and 5 scientific dissemination sites. A blog managed by Stanford University's computer science department (Progress in Artificial Intelligence) discusses in detail the implications of the algorithms presented in the article, highlighting their potential to transform the analysis of large datasets across various fields, from medicine to economics. Another scientific dissemination site, known for its focus on artificial intelligence (AI Everyone), offers an accessible overview of the article, focusing on how the algorithms can be used to improve data processing efficiency. These links not only increase the article's visibility but also underline its applicability across multiple areas of computing and technology. The fact that the article is discussed and analyzed in these diverse forums indicates its significance in the field of data science and its ability to influence the future development of machine learning technology.</i></p> |
| <p>Downloads Evidence <i>Usage and Visibility</i></p> | <p><i>The recent article in PLOS ONE has generated significant interest in the scientific community and among the general public. In just one month after its publication, it recorded 3223 visits and 1503 PDF downloads, indicating that nearly half of the visitors downloaded the complete article, reflecting significant interest in its findings. Additionally, 50% of the downloads occurred consistently over the last three months, with an average of 250 downloads per month. The article's accessibility, facilitated by PLOS ONE's open access (Gold), has contributed to this broad dissemination. This trend suggests that the article is of great interest not only to researchers in biology and ecology but also to educators, students, and a broader audience interested in topics such as marine conservation and genetics.</i></p> |
| <p>Presence in libraries Evidence <i>Usage and Visibility</i></p> | <p><i>This book is available in 47 national and international libraries, according to WorldCat and the collective catalog REBIUN. Of these, 30 are university libraries in Spain. A detailed analysis reveals that approximately 20% of these libraries are located in the Community of Madrid and Catalonia, and another 20% in Andalusia, demonstrating the book's strong presence in Spain's main academic regions, indicative of its importance and acceptance in the philosophical and academic realm. The concentration of copies in renowned universities such as the Complutense University of Madrid and the University of Barcelona, as well as in regional institutions, underscores its relevance in teaching and studying contemporary philosophy in Spain. Internationally, it is present in 7 French libraries, including the Bibliothèque interuniversitaire de la Sorbonne (BIS) and the Bibliothèque Universitaire de Strasbourg, and in three libraries in the United Kingdom, such as the Bodleian Library at the University of Oxford and the British Library. This wide presence in university libraries suggests the book is a reference work in philosophy and ethics courses, evidencing its influence on the training of future generations of philosophers and thinkers.</i></p> |

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CONTRIBUTORSHIP

DTS – Conceptualization; Formal Analysis; Investigation; Methodology; Project administration; Supervision; Writing – original draft
 EOM – Conceptualization; Validation; Writing – original draft
 ADV – Conceptualization; Validation; Writing – original draft
 JG – Validation; Writing – review & editing
 WAM – Formal Analysis; Visualization; Writing – original draft; Writing – review & editing

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