

METADATA USAGE TENDENCIES IN LATIN AMERICAN ELECTRONIC JOURNALS

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Abstract

The present study investigates the extent to which metadata tags are used in Latin American electronic journals, and whether these journals in fact provide basic information (abstracts, keywords, etc.) that could be tagged as metadata. The authors also studied multilingualism in the marked-up information and in the basic information, particularly the use of English (which can help bring the scientific production of Latin America to a wider audience). In total, 45% of the journals had metadata; the metatags *keywords* and *description* were the most commonly used. The inclusion of structured metadata from the Dublin Core Metadata Element Set in the journals was found to be very low, only 13%, and primarily existed in journals from Argentina, Costa Rica, and Brazil. The articles examined did not always include abstracts and keywords (84% and 77% respectively), but in the articles that did have them, English was frequently used (85% in abstracts and 91% in keywords). The <title> element was found to be used deficiently: Only 42% of full text OA articles had their actual title in the <title> tag, which can potentially affect visibility in a search engine results. In sum, the road to marked-up metadata in all journals is still long, and there are great inconsistencies in how metadata are employed and in their content. The authors conclude that there are signs that support and efforts to increase awareness of how metadata can easily be included in a journal's web site may result in improved metadata and greater visibility.

Keywords: Metadata; Scholarly journals; Latin America; Open Access journals; Metadata usage patterns.

1. Introduction

Open Access (OA) in Latin America has emerged as an alternative strategy for making research visible in response to the under-representation of the region's research output in the major systems of scholarly article dissemination around the world. These OA articles can be found through search engines, and are thus easily available to the scientific and student communities. However, the retrieval capabilities of a harvesting system (or even of a regular web search) are highly dependent on the quality of the information being marked up for the document. Challenges to search engines or aggregators of metadata due to inconsistencies or inadequate quality in the metadata have been reported repeatedly [1, 2, 3, 4, 5]. Even in a field as apparently innocuous as the titles on the web page, good quality is essential. The average user spends only a few seconds sifting through the results of a web search [6], and providing an irrelevant title displayed among the search results will cause the loss of an opportunity to connect the researcher to the journal's information. At the same time, previous research has demonstrated that users retrieve information more efficiently when using metadata [7].

With its point of departure in a previous study of the characteristics of Latin American OA journals [8] and a study of metadata occurrence in English, French, and German language OA journals [5, 9], this paper further explores the occurrence and the contents of marked-up metadata in Latin American OA journals. These journals (with a sample size of 123) have been drawn from the LATININDEX - Regional System of Scientific Journals of Latin America, the Caribbean, Spain and Portugal - electronic resources index [10]. In addition, the occurrence of visible metadata in the form of bibliographic data displayed on the page will be placed in relation to the marked-up metadata. In order to put the use of metadata in Latin American journals into perspective, the frequency and estimated quality of metadata in this sample will be compared to metadata usage in journals published primarily in Europe and North America [5, 8, 11], to examine whether or not the usage patterns diverge.

Latin American journals are primarily published in three languages: Spanish, Portuguese, and English, and very often in combinations of these. However, the provision of metadata is irregular at best [8], in particular such metadata as multilingual abstracts and keywords (with some journals still failing to provide basic data such as keywords in any language, for example). The addition of such information is not only beneficial for the 330+ million speakers of Spanish, but also for the global community of researchers that uses other languages (such as English) to communicate among themselves, and who might benefit from the results of science produced in Latin America. The regular addition of multilingual information is vital for the visibility of the region's science, and for increased opportunities

of scientific co-operation in our modern world.

An improvement in both (non marked-up) visible and marked-up metadata could be forthcoming, given that attempts to encourage the inclusion of multilingual metadata are being made by such initiatives to promote Latin American OA journals as LATINDEX, SciELO and RedALyC. An English translation of title, abstract, and keywords is mandatory in the journals included in SciELO [12], and encouraged among the RedALyC journals (using the OAI-PMH version 2.0) [13], and LATINDEX journals [10] as part of the quality criteria of the system. The results from this paper can give a better picture of the current situation and potential needs to increase these efforts in the future.

The inclusion of abstracts and keywords in scholarly articles still varies quite a bit depending on disciplinary practices. They are, for instance, more common in the exact sciences and medicine than in the humanities (e.g. [9], p. 263). In a study of scientific journals by Berkenkotter and Huckin [14], they found that abstracts began to appear in the journals in the 1950s, and became more common, as well as longer and more informative over the years (p. 34). Charles Bazerman [15] has noted that in the American Psychological Association's Publication Manual (APA), the 1950s was also when summaries gradually began to turn into what we today consider to be an abstract (and placed at the beginning rather than the end of the article).

Abstracts and keywords could by many definitions be considered metadata, and the metadata concept predates the Web. The word *metadata* itself was coined in 1969, when Myers used it to name a data exploration company, and appeared in print for the first time on a brochure in 1973 [22]. In a Web context, marked-up metadata have been used in electronic publications from early on, and the discussion about metadata has been particularly active since approximately 1996 when the Dublin Core Metadata Initiative [16] emerged as an alternative to MARC. This event enhanced the spread of marked-up metadata and nowadays, metadata is often put forth as the essence of the Semantic Web. Whereas metadata is often discussed in terms of more advanced protocols such as OAI-PMH and RDF, what we focus on here are the more basic bibliographic data that may be marked up in an HTML file, included in the document properties of a PDF file, or simply included as visual metadata. Thus, we apply a broad understanding of what metadata are, in line with the "data about data" view. The HTML elements <title> and <meta> exist in the very early versions of HTML recommendations (cf. e.g. [17]). <meta>, an optional element, is often used with server-directed information through the http-equiv attribute; with various types of metadata directed at human readers, such as keywords, description, and author; and with metadata provided by HTML generators. However, it can also be used with other standards, such as the Dublin Core elements.

Bruce and Hillmann [18] outline three strategies for how metadata can be created as part of larger collections: through author self-submission; through human judgement in the classification process; and through “automated text-extraction techniques to pull metadata from a text corpus” [18]. These strategies are also relevant in cases of single journals, even though they may be effected less strategically. Authors may provide MS Word or PDF files that are used as are, with metadata attached more or less consciously. Furthermore, authors are often encouraged to include an abstract, keywords, and affiliation data when they submit an article. At the same time, the decision to mark these metadata in (X)HTML is often done by the journal’s editorial staff, who is responsible for any attempts to structure the journal’s metadata. Presumably, when it comes to OA journals, automated text-extraction techniques are seldom used to extract such data as authors, abstracts, and keywords, but various (X)HTML editing programs automatically add metadata concerning for instance content type, generator, and robot instructions.

When metadata are included in the source rather than placed and distributed in a separate file, they are less easily included into aggregators and other services for shared metadata. Embedded metadata are, however, an important first step to providing shareable metadata, and they offer information about the journal or article which may be used in various ways – both directly by users, and, if the metadata are reasonably structured, to be collected automatically and included into aggregators. In the latter case, it is important that the metadata maintain a minimum level of quality. Authors concerned with the quality of shareable metadata have pointed to consistency and coherence, conformance to expectations and standards, as well as contextual data as important factors contributing to metadata quality [18, 19]. However, these issues have mainly been discussed with regard to repositories and aggregation services, not individual journals.

Previous research has shown that in Latin American journals, metadata are not commonly used. Córdoba and Coto [8] found that only 35% of the journals studied used them at any level. However, the work done by SciELO and REDALyC may change these figures in the future. In a questionnaire study with editors of Brazilian e-journals in 2003-2004, few of the editors were familiar with such metadata standardisation initiatives as the Dublin Core Metadata Element Set and OAI-PMH [20]. Approximately one third of the editors answered that they knew about the Dublin Core Metadata Element Set, but no journal claimed to use it.

Rovira and Marcos [11] analyzed how metadata was used in 61 Library and Information Science (LIS) journals that were published OA. 59% of the sites they analyzed lacked metadata that could be useful for information retrieval and metadata was included in no more than 13% of the articles. The authors studied three different levels of the site: the front page, the first 50 pages nearby the front page, and the first and second articles in each journal that was analyzed.

In a study of 265 international editor-managed OA journals, where approximately 75% of the journals were published in Western Europe, North America, Australia or New Zealand, Francke [5, 9] showed that most journals publishing in HTML contained a <title> element, and 90% of the journals in the study included the <meta> element in some form. Most common was the use of <meta> elements targeted at servers, using the attribute http-equiv (76.5-80.5% depending on journal level), whereas keywords, description, and generator occurred in one fourth to one third of the journals in the study. Metadata marked up using one of the Dublin Core elements were present in less than 10% of the journals. In that study, the quality of metadata was generally fairly low – consistency in content between issues of the same journal was often lacking, and reliability and timeliness of the data was not always as high as could be wished for.

Even if metadata were not marked up in HTML, they more commonly occurred as visible metadata on the article page or on another place in the journal, such as an article presentation page or in the table of contents. Thus, the name of the author and the article title were present in all journals; the author's affiliation in 86.8%; abstracts in 78.9%; and keywords in 40.4% of the journals [5].

In light of these previous studies, we have looked at Latin American OA journals' use of visible and marked-up metadata to ascertain if and where there may be a particular need to draw journal editors' attention to how they may further improve the visibility of the articles published in their journals.

2. Methodology

The present study investigates Latin American OA journals with a methodology which draws on the quantitative survey in [8] and expands that study by a further focus on metadata, particularly with regard to multilingualism. The sample has been selected among the journals included in the LATINDEX database. The journals are peer reviewed, Open Access, and contain at least 40% scientific content. They are published independently, not as part of a larger collection site (such as SciELO or RedALyC) that might have caused their content to conform to very similar publishing standards. We selected a sample from the 12 different countries and territories that had more than 10 journals in the catalogue from the Electronic Resources Index: Argentina, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, Mexico, Peru, Puerto Rico, Uruguay and Venezuela. Within each country group, we randomly chose 10% of the journals, which resulted in a sample of 167 titles.

When the bulletins, non peer-reviewed journals, and science education magazines had been discarded, together with the SciELO and RedALyC journals, we

reached 123 journals with an estimated sampling error of 7.5%. From the selected journals, we chose the most recent issue and one of the research articles, most often the first one that was not an editorial, a book review, or other non-scientific article. As many international organizations divide Latin America into four sub-regions, we chose this partition to compare the data between them, as there are differences in the publishing patterns in the various sub-regions. For instance, Chile, Argentina and Brazil (in the Southern part of the continent) have publishing cultures that are much more developed than those of the Andean Area. The sub-regions we use are: North: Mexico and Central America; Andean: Colombia, Venezuela, Peru, Bolivia, and Ecuador; South: Chile, Argentina, Uruguay, Paraguay, and Brazil; Caribbean: The nations in the Caribbean Sea and Puerto Rico.

2.1. Survey study

We have studied four levels within individual journals:

- (i) *Cover*: Cover page of the electronic journal (entry page, first page)
- (ii) *Table of contents* (TOC): Table of contents of the latest issue
- (iii) *Article presentation page*: Presentation page for an article, which contains information but not the “full text” of the article (if it exists).
- (iv) *Article text*: Full text page for an article.

The focus of the study has been on the representation of metadata, both visible and marked up. However, an important aspect, both when it comes to how the metadata may be used and the flexibility of what metadata can be included, is what file format the journals – and particularly the articles – are published in. In Francke’s study described above [9], cover and TOC level pages were mainly published in some form of HTML, whereas the diversity was much larger at the article level. Other factors that may influence the usability of metadata are the use of frames or Content Management Systems, and the validity of the markup. The technical implication of frames is that what is perceived as one web page is made up by several files. Each file may contain metadata, and at worst, the metadata are in conflict with each other. Furthermore, it may not be advantageous with regard to retrieval (e.g. in the results list of a search engine search) that all pages on the site have the same value to the <title> element, namely that of the frameset file [5]. More and more journals use some form of journal management system, such as the PKP’s Open Journal System, which often provide ample opportunities for metadata inclusion. Thus, a comprehensive use of metadata may be prompted by such a system. In terms of usefulness for retrieval or harvesting of metadata, harvesting of metadata may be easier to achieve if the HTML files are valid HTML. This was the motivation to also look at the validity of the HTML files at the various journal levels.

Three types of metadata were studied. These were the existence of and value of the <meta> element and the <title> element respectively (or the document properties for PDF files), and the inclusion of abstracts, keywords, author affiliation, and date of submission/acceptance/publication for the articles. The languages of abstracts and keywords were noted specifically, because it is of importance to international visibility and accessibility which languages are used. The details of the variables will be further elaborated in relation to the presentation of results below.

The data were processed using a Microsoft Access ® 2003 database with JET-SQL. For sections 3.4 and 3.5, the inferential statistics were calculated using the SAS JMP 8.0 statistical software.

3. Results

In this section, we present the findings on metadata usage in the Latin American OA journals included in the sample. The findings are discussed further under the heading Discussion below.

3.1. General characteristics of the sample

Our corpus was made of 123 journals. From these journals, 81% of the latest issues were published between 2007 and 2009. Only 3.3% were published prior to 2000. In other words, as of April 2009, 60% of the sample was less than a year old and 75% was less than two years old. Two journals in the sample did not offer any way of identifying their publishing date.

The journals used four different types of file formats for publishing their articles (Table 1).

Format	Journals	(Subformat)	Journals
HTML	33 (26.8%)	HTML 3.2	1 (0.8%)
		HTML 4.0 Transitional	3 (2.5%)
		HTML 4.01 Frameset	1 (0.8%)
		HTML 4.01 Transitional	13 (10.7%)
		HTML Non-specified	7 (5.8%)
		XHTML 1.0 Frameset	2 (1.7%)
		XHTML 1.0 Transitional	6 (5.0%)
PDF	105 (85.4%)		
Both PDF and HTML	17 (13.8%)		
Other formats	2 (1.6%)	Flash	1 (0.8%)
		MS-Word	1 (0.8%)

Table 1. File formats in the sample.

85% of the journals published articles in PDF and 27% published their articles in (X)HTML format. 14% of the journals (included in the previous figures) in fact used both HTML and PDF for their articles. If we compare these data to corresponding data from 2008 [7], we find only small differences: In 2008, 83% of the sample published the articles in PDF, 27% in HTML, and 11% of the journals used both file formats.

Most of the journals use the native language of their country of publication in their articles. Only 13% of the journals used English and approximately 3% had articles in a third language.

Content Management Systems of some sort were used by 29% of the journals. While most of the encountered examples were simply embedding the journal into a pre-existing institutional platform (such as the Mexican e-Journal and the Cuban and Brazilian *BVS*), 9% of the journals used OJS (particularly in Brazil and Argentina), and slightly more than 5% used other CMS systems, as is shown in Table 2.

Platform	Journals that use the platform
Total	36 (29.2%)
Institutional Portals	18 (14.6 %)
OJS (OJS-PKP, SEER/OJS)	11 (8.9%)
Joomla!	4 (3.3%)
Lapacho	2 (1.6%)
Drupal	1 (0.8%)

Table 2. Content Management Systems found.

As many as 31% of the journals use frames. This makes it even more important to consider how and where marked-up metadata are included in order to be displayed and used efficiently. The use of frames could mean more work for the editors and fewer possibilities to find or share metadata.

3.2. Journal levels and validity

Electronic journals can have a variety of levels, depending on what choices have been made with regard to their architecture. Not least, subscription journals may require quite a few levels to be visited before the reader reaches the article file. Most OA journals include at least a cover page, a table of contents, and an article level. As described in Table 3, all journals but one in the sample have cover pages. The fact that one journal is missing a cover page is in itself surprising, given that one would expect that all journals have cover pages of some sort. The one journal that lacked a cover page provided only a list of files on an FTP frame, which could not be considered as a "cover". While many journals have tables of contents pages, fewer than 30% have article presentation pages (a practice common in other pub-

lishing cultures), and only about 27% have full text articles in HTML format. The article presentation pages could serve a particularly important role when the article file is offered in a format other than HTML, both in terms of providing a place to include marked-up metadata and as a source of information for those who may for some reason not have the proper software installed to view PDF files or Flash pages, for instance.

Total journals	Have cover page	Have table of contents	Have article presentation page	Have article in full text (HTML)
123	122 (99.2%)	100 (81.3%)	35 (28.5%)	33 (26.8%)

Table 3. Levels of the journals.

That the HTML pages of a journal are valid HTML can be of importance in terms of offering long-term accessibility to the files, as well as to make it easier to automatically retrieve marked-up or visual metadata from a file (cf. [5]). For this reason, the validation errors of the files at each journal level were investigated and are reported in Table 4. The figures are sometimes higher than would have resulted from a manual investigation of the files, as the figures were generated by the W3C HTML Validator, where one mistake in the coding may result in several errors. As can be seen from these figures, there are journals with valid HTML files, but there are great differences between journals.

Validation errors	Cover page	Table of contents	Article presentation page	Article full text page (HTML)
Median	27	27	13	18,5
Highest value	584	787	292	1257
Lowest value	1	0	0	0

Table 4. Validation errors.

3.3. Marked-up metatags (<meta>)

Table 5 describes the usage of metatags within the journals in this study. While at first glance many journals appear to use metadata (87% use some form of metadata in their cover page, for example), most of these metadata are computer generated, and of very little utility to describe the actual contents of the web page. When we eliminate the computer generated *http-equiv* tags <Content-Type> and <generator>, and the automatically generated <ProgID>, a radically different picture emerges. Only 45% of the journals have metadata in their cover page. The percentage rises at the article presentation page and full text page levels if we look at the

existence of <meta> tags in relation to the total number of journals with HTML files at these levels (57% and 49% respectively for non-automatic metadata).

	Cover page (n = 122)	Table of contents (n = 100)	Article presentation page (n = 35)	Article full text page (HTML) (n = 33)
Have any kind of metadata	107 (87.7%)	84 (84.0%)	34 (97.1%)	25 (75.8%)
Have non-automatic metadata	55 (45.1%)	42 (42.0%)	20 (57.1%)	16 (48.5%)

Table 5. Use of metadata in the journals.

Tables 6a and 6b list the most used tags within each level of the journals. While they vary for each level, the meta *description* (which is highly priced by search engines) is the only one that appears among the most common attributes on every level.

Level: Cover (n = 55)		Level: Table of contents (n = 42)	
<meta> attribute	Occurrence	<meta> attribute	Occurrence
keywords	32 (58.2%)	keywords	25 (59.5%)
description	32 (58.2%)	description	24 (57.1%)
author	15 (27.3%)	robots	13 (31.0%)
robots	14 (25.5%)	author	11 (26.2%)
copyright	6 (10.9%)	DC.Creator	6 (14.3%)
DC.Creator	6 (10.9%)	revisit-after	5 (11.9%)
revisit-after	6 (10.9%)	Content-Language	5 (11.9%)
Content-Language	5 (9.1%)	copyright	5 (11.9%)

Table 6a. Most common metatags on the “cover page” and “table of contents” levels.

Level: Article presentation page (n = 20)		Level: Article full text page (n = 16)	
<meta> attribute	Occurrence	<meta> attribute	Occurrence
DC.Language	10 (50.0%)	keywords	8 (50.0%)
DC.Title	10 (50.0%)	description	8 (50.0%)
DC.Description	9 (45.0%)	author	4 (25.0%)
DC.Type	9 (45.0%)	robots	3 (18.8%)
DC.Subject	8 (40.0%)	Originator	3 (18.8%)
DC.Creator	8 (40.0%)	pragma	2 (12.5%)
DC.Identifier	8 (40.0%)	expires	2 (12.5%)
description	8 (40.0%)	Content-Language	2 (12.5%)

Table 6b. Most common metatags on the “article presentation page” and the “article full text” levels.

Table 7 describes the use of metadata within the PDF files. While 105 journals use PDF to publish their articles, only 65 of those PDFs had any information within

their metadata spaces. The situation looks quite promising in this table. However, the way the metadata are worded indicates that these metatags are almost never considered by the editors, and the tags almost always contain information that has little or no relevance to the article.

PDF (n = 65)			
Metadata type	Occurrence	Has at least one word in common with the actual datum	Matches the actual datum
Title	63 (96.9%)	15 (23.8%)	4 (6,3%)
Author	49 (75.4%)	7 (14.3%)	5 (10,2%)
Subject	9 (13.8%)	-	-
Keywords	3 (4.6%)	3 (100%)	3 (100%)

Table 7. Metadata in PDF files.

3.4. Dublin Core Metatags

Among all journals, only 13% use Dublin Core metatags. Table 8 describes the use of DC tags by region, and table 9 describes it by discipline. Whereas no specific group stands out in the discipline table, the region table suggests a pattern of usage, pointing to more use of DC metatags in South and Central/North America. The region grouping is not significant ($p = 0.11$). However, if we separate the groups into their constituent countries, a significant pattern emerges. Table 9 describes the use of DC tags by country and clearly sets apart Costa Rica and Argentina from the rest of the countries and territories. This might be due to the fact that both of these countries have constant training programs, which have aimed, among other things, to raise awareness about standards such as Dublin Core metatags. While Brazilian journals report a use of 17% of DC tags (which is high within this group of countries), Brazil does not yet come as significantly different from the lowest signification group, which is surprising given that it also has important programs to provide the editors with pre-installed CMS platforms. These observations will be further reviewed in the discussion section.

Region	Total journals	Journals with any kind of DC tags, on any level
All regions	123	16 (13.0%)
Andean	23	1 (4.3%)
Caribbean	10	0 (0.0%)
Central / North	34	5 (14.7%)
South	56	10 (17.9%)

Table 8. Dublin core metatag usage by region.

	Total journals	% of usage of DC	Signification groups ($\alpha = 0,05$)
Argentina	17	35.3%	B
Brazil	23	17.4%	B C
Chile	12	0.0%	C
Colombia	11	9.1%	C
Costa Rica	6	66.7%	A
Cuba	6	0.0%	C
Ecuador	2	0.0%	B C
Mexico	28	3.5%	C
Peru	3	0.0%	B C
Puerto Rico	4	0.0%	C
Uruguay	4	0.0%	C
Venezuela	7	0.0%	C

Table 9. Usage of Dublin Core elements by country. Groups not connected by the same letter are significantly different.

3.5. Presence of basic information describing the article (abstract, keywords, etc.)

Table 10 describes the occurrence of features considered basic when publishing a scientific article. These features should ideally be present in all articles, as they help authors, readers, and information specialists to catalog and effectively distribute and retrieve the results reported in the article, as well as in deciding if the article is of interest to the reader. However, only 84% of the articles had abstracts, and only 77% of them had keywords. As can be seen, the occurrence of author affiliation information is not much higher. The 45% occurrence of “date of reception/acceptance” should be considered an urgent task to tackle by the editors.

Whereas more than three quarters of the journals included keywords and abstracts in their visual metadata, and more than 60% of the journals have keywords and abstracts in more than one language, these data are seldom marked up as metadata. The title was the information that was most commonly marked up within the metatags, but this was the case in only 14% of the articles. Multilingual marking in the metas was extremely uncommon.

As for the occurrence of abstracts and keywords across disciplines, we found that there was a tendency ($p < 0.1$) for Engineering and Medical journals to more often include abstracts and keywords than the rest of the disciplines (the full comparison is presented in table 11). This can be connected to varying publication practices in different epistemic cultures (cf. [21, 9]). However, it is interesting that abstracts and keywords are relatively rare in the exact and natural science journals in this study, as the publication practices in these cultures would lead us to expect

that they would include abstracts and keywords more often than journals in the social sciences and humanities.

Article features (n=123)	Articles with the feature	Multilingual	Marked as <meta>	Two or more languages marked as <meta>
Title	123 (100%)	38 (31.0%)	17 (13.8%)	1 (0.8%)
Abstract	103 (83.7%)	80 (65.0%)	9 (7.3%)	2 (1.6%)
Keywords	95 (77.2%)	78 (63.4%)	8 (6.5%)	1 (0.8%)
Author affiliation	105 (85.4%)	-	5 (4.1%)	-
Date received / accepted	55 (44.7%)	-	4 (3.3%)	-

Table 10. Occurrence of basic article features (titles, abstracts, keywords, author affiliation and date of reception/acceptance)

Subject	Journals with abstracts (n = 103)	Signification groups (α = 0.1)	Journals with keywords (n = 95)	Signification groups (α = 0.1)
Engineering sciences	8 (100.0%)	A B	8 (100.0%)	A
Medical sciences	24 (96.0%)	A	23 (92.0%)	A
Agricultural sciences	7 (87.5%)	A B C	7 (87.5%)	A B
Multidisciplinary	5 (83.3%)	A B C	4 (66.7%)	A B
Social Sciences	44 (80.4%)	B C	39 (71.4%)	B
Arts and Humanities	8 (72.7%)	C	7 (63.6%)	B
Exact and Natural Sciences	7 (70.0%)	C	7 (70.0%)	A B

Table 11. Use of abstracts and keywords in Latin American Journals. Groups not connected by the same letter are significantly different.

Article feature	Title	Abstract	Keywords
Total articles	123	103	95
Use of one language			
National language only	66 (53.7%)	13 (12.6%)	7 (7.4%)
English Only	16 (13.0%)	10 (9.7%)	10 (10.5%)
Third Language only	3 (2.4%)	0 (0.0%)	0 (0.0%)
Use of two or more languages			
Both national language and English	33 (26.8%)	69 (67.0%)	70 (73.7%)
Both Spanish and Portuguese	0 (0.0%)	2 (1.9%)	1 (1.1%)
National language, English and a third language	5 (4.1%)	9 (8.7%)	7 (7.4%)

Table 12. Languages used in the article features studied. Percentages have been calculated based on the number of journals in which the feature (title, abstract, keywords) exists.

Of the articles that had abstracts, about 15% of them did not include a version of the abstract in English. (In all cases where a “third language” was found, the article also contained the information in both English and the national language). The translation of the titles, however, was much less frequent: only about 46% of the articles had a version of their titles in English.

3.6. Titles

It is alarming in itself that only 76% of the journals have their own title marked up as <title> on the cover page; even more so that the title of the article occurs so infrequently in the presentation pages (29%) and in the full text pages (42%). This is particularly distressing when we take into account that one of the premises of Open Access is web access. The titles of the web pages are the most prominent part of the search results displayed by all major search engines presently in use, and the fact that more than half of the web pages examined do not even feature the name of the article (and that quite a few contain elements that have nothing to do with the title) weighs heavily on their capability to be retrieved, and ultimately, on their visibility.

<title> content	Level: Cover (n = 122)	Level: TOC (n = 100)
Journal title	93 (76.2%)	71 (71.0%)
Institution name	24 (19.7%)	17 (17.0%)
Issue information	2 (1.6%)	49 (49.0%)
Two or more of the above	9 (7.4%)	41 (41.0%)
None of the above	10 (8.2%)	10 (10.0%)

Table 13a. Title elements (levels “cover” and “table of contents”).

<title> content	Level: Presentation page (n = 35)	Level: Article full text page (HTML) (n = 33)
Journal title	14 (40.0%)	14 (42.4%)
Institution name	12 (34.3%)	12 (36.4%)
Issue information	6 (17.1%)	5 (15.2%)
Two or more of the above	7 (20.0%)	4 (12.1%)
Article title	10 (28.6%)	14 (42.4%)
Author name	8 (22.9%)	4 (12.1%)
Both article title and author’s name	0 (0.0%)	0 (0.0%)
None of the above	3 (8.6%)	1 (3.0%)

Table 13b. Title elements (levels “presentation page” and “full text HTML page”)

Titles should be unique identifiers of each page, and as such, they should be unique for every page. However, of all journals, 49% had titles repeated on two or more levels, and 31% had the exact same title on all levels.

4. Discussion

The first thing to be noted about these results is the widespread use of PDF files to publish the journals, almost never accompanied by their corresponding HTML versions. This use is even more common among the journals in this sample than was the case in the study of English, French, and German language journals reported in [9]. In Francke's study [9, p. 209-211], there were signs of a trend from HTML publishing of articles to PDF publishing when the choice of file format of the articles in the first issues of the journals was compared to that in the most recent issues. The prevalence of PDF in the Latin American journals could thus be either a regional pattern or could be part of an international trend towards more and more PDF publishing in open access journals, or could be a response to the relative ease of creating PDF files. Compared to the journals in Francke's study, the number of different file formats is also lower, illustrating what might be a trend towards PDF and HTML publishing. However, the percentage of journals that publish articles in another format than either of the two dominating ones is equivalent in the two studies.

If there is indeed a move towards PDF publishing, as these two studies indicate, it will have consequences for the use of metadata as it is more difficult to extract metadata from PDF files than from HTML files, and as this study also shows signs that editors much more seldom pay attention to the content of metadata entries in PDF files than they do in HTML files. It is not uncommon that the title information contains the name of the file that was used to generate the PDF file, and that the author field gives the name of the person registered to the original software. Table 7 shows that subject and keywords are seldom included in the PDF files. One way in which to handle the article-level metadata is to place them in the <meta> element of an article presentation page in HTML. These pages are in fact (very) slightly more common than article files in HTML in the present study.

The most commonly used metatag among the journals in the sample is *keywords*, which roughly coincides with the findings of Rovira & Marcos [11]. While the tag *keywords* has been discredited because of black hat search engine optimization practices such as keyword stuffing, the second most common tag, *description*, is still immensely important (Google, for example, frequently uses it as the snippet to display below the web page's title). The figures for the meta attributes key-

words, description, and author are in all cases higher in the study of English, French, and German language journals [9] than in the present study, but it is only a case of fairly small differences except in the case of keywords and descriptions on the cover page and author information in the article files, which are decidedly more common among the journals in the earlier study. On the other hand, the attribute robots occurs more frequently among the Latin American journals, and metadata that are marked up with Dublin Core elements are more frequent in the Latin American study.

Even though Dublin Core is still rarely used, the pattern of use of DC metatags shown in tables 8a and 8b point in an interesting direction. The two countries that are significantly different in the sample (Costa Rica and Argentina) have tried to maintain regular efforts to train editors at a local level, and thus raise awareness about metadata standards through initiatives such as the LATINDEX Project in Costa Rica and the CAICYT Office in Argentina. Overall, it could be argued that training (in the form of workshops and production of manuals), is a way to promote the use of higher-quality metadata, and further studies could help clarify and confirm these findings.

On a final note about the Dublin Core norms, their use is slightly higher in the Southern region; probably because of its more developed editorial cultures and higher presence in indexes such as the ISI (this is particularly true of Brazil, Chile and Argentina).

Returning to metadata in general, the study from 2008 [8] showed that 35% of the journals used some kind of non-automatically marked-up metadata. There has been an improvement in this number, which is now reported as 45%. This increase will have to be verified in future years to determine whether the trend towards increased use of metadata continues in the region.

Based on this sample, it does not seem as though Latin American OA journals are provided with marked-up metadata through the <meta> element more seldom than journals from other parts of the world. Rather, the use reflects the fairly low occurrence of the <meta> element in many independent OA journals in other areas. Francke [5] has argued that this low use could be a reflection of the lack of routines for assigning metadata to resources prior to publication. In Latin America, this pitfall is made worse by a lack of knowledge of these standards, and by the additional costs (not so much in equipment and software, as for training of human personnel) involved in the manual manipulation of metadata.

One of the most prominent results from the study is the low use of non-national languages in the titles (46%) and as the main language of the articles (16%). A very interesting part of the reality in the region is the ongoing debate of the national languages as “languages of science”, as opposed to the use of English as a vehicle of international scientific communication. This is particularly true in

the case of Spanish. The efforts of official authorities such as the Spanish *Real Academia de la Lengua*, combined with a strong linguistic self-esteem, the sheer number of speakers, and the feeling that “local science should be communicated to the locals, in their language”, have lead to comparatively smaller use of English as an academic language in Latin America. This clashes directly with the policy of systems such as Scopus, that demand their journals to be written in English. Systems such as SciELO and RedALyC have progressively become more strict in demanding that articles have abstracts and keywords in English (LATINDEX merely recommends that they do), which might contribute to the increased use of English in the journals examined (73% of all journals had abstracts in English; 72% had keywords in English).

The basic features that are described as basic information included as visual metadata in or in relation to the articles, such as title, abstract, keywords, and author affiliation occur in more than 75% of these journals, similar to what Francke [9] found in her study. The date when the article was received or accepted, or alternatively when the page was updated, occur less often, however, in less than half of the journals in both studies. One remarkable difference between the findings of the two studies is that keywords are significantly more common in the Latin American journals. Possibly this could be a result of the fact that the number of journals in the present study that come from the exact sciences and medicine is larger than in the other study, which had a larger section of journals from the arts and humanities. Abstracts and keywords are less common in the arts and humanities than in other academic areas, but this does not account for the smaller difference in the figures for abstracts in the two studies, even though fewer journals in Francke’s study also included abstracts than was the case here.

Finally, even though the advantages of Content Management Systems geared towards electronic publishing (such as OJS or EPrints) in terms of both time and money have been documented, few journals in Latin America make use of these platforms. Only about 29% of the journals use any kind of auxiliary platform, and even fewer use free, open source programs to help their publishing processes. Brazil is an important exception to this. More than 500 journals are already using the OJS system in Brazil (more specifically, a locally-produced derivate of OJS named SEES) [25]. The OJS system uses Dublin Core by default to describe the uploaded content, so it potentially could help improve the quality of metadata in these journals.

The data in the present study show that even though Latin American OA journals are most often on par with and sometimes even better than journals from a wider selection of countries at including marked-up and visual metadata on various levels of the journal, much work still remains in order for all journals to provide standardized and high quality metadata. As the results from the study of the <title> and <meta> elements prove, there is still a lack of consistency in which <meta>

elements are included and in what the <title> elements contain. There is also a low use of established standards such as the Dublin Core Metadata Set. There is still some way to go before the metadata can be considered shareable across journals.

5. Conclusions

All journal editors face difficult questions when trying to balance their annual budgets, and while many of them would like to invest in building top-of-the-line web sites, fully optimized for search engines and with powerful options for the readers, this remains a budgetary dream for most, something that in many cases is put off as “maybe next year”. In Latin America most journals work as teams of a few dedicated individuals, borrowing office space, computer power and assistant time from their own research laboratories. These editors, toiling quietly in the back, would be more than willing to incorporate new technologies into their existing journals, as long as the cost is not prohibitive and they have support from someone who will explain to them just how to do it.

Let us consider, for example, what could be thought of as the cheapest of all the technologies discussed here: setting a <title> tag for a web page. This requires nothing more than a few keystrokes, a person who has read the title of the article, and a naming standard for each level, which would not take more than a few minutes to define in an editorial board meeting. These simple measures take on a new meaning when discussed against the background of search engine mechanisms and visibility. Google, for example, explicitly asks for programmers to make <title> tags “descriptive and accurate” [23], while search engine optimization literature frequently quotes <title> as a vital part of ranking algorithms, and insists that practices such as title repetitions could be penalized because they could potentially represent “duplicate content” [24]. If more information trickled down to the editors that would explain to them why these considerations are important, many of them would be willing to improve on the low rates of inclusion of metadata in our sample (only 42% of the articles had their own title in the <title> element). We believe that it is the role of the researchers to assist in the transfer of this knowledge, and make sure it expands beyond the academic surrounding and into the hands of editors and journal directors.

While PDFs are a useful resource, and still one of the most inexpensive ways to publish electronic materials, the meta-information within the PDFs in this sample was used erratically, and the document-centric view that focuses on PDFs distracts editors from the fact that a structured web site (with table of contents and article

presentation pages) provides very good opportunities to describe the contents of their journal. As Francke [5] suggested, the use of a cover page and a 'table of contents' is not enough, and the use of article Presentation pages would greatly contribute to article retrievability in general when PDF is used as the publishing format for the articles. Our results show that most of the keywords are concentrated on the cover and table of contents levels. The article presentation and article full text pages, when they exist, do not use as many metadata, and are therefore under-described. Since it is in these pages the information researchers are looking for resides (information which is also sought after by aggregators and metadata harvesters), more efforts are needed to optimize these pages and make them as visible and well documented as possible.

Full text web pages (be they programmed using HTML, PHP, or XML displayed through CSS or XSLT templates) can take advantage of the many opportunities of interactivity, reader-input, and multimedia that are desirable for our future scientific papers. Obviously the best of all solutions would be to provide fully marked XML files for every article, which could be exploited for information by numerous systems. This is precisely the promise of the semantic web when combined with Open Science: Massive inter-operability of scientific information and corpora, which could bring new ways of data mining, and ultimately of getting to information. The use of more data-centric programming techniques will help our journals prepare for the Web 3.0 and its exciting possibilities. However, even if XML marking could potentially render the <meta> tags obsolete because any of the information currently thought of as a meta (abstracts, keywords, dates of acceptance, authors and their information, etc.) would be properly marked, this would bring us back to where we started: This information cannot be marked unless it exists. In Latin America most of the journals are published by small, independent units, not by large publishing companies. This involves a group of editors from different epistemic cultures, many of them self-taught, that are not always aware of why this information is important.

The cost of producing full XML articles is, at least for the time being, prohibitive to most of the publishing institutions in Latin America. (Only RedALyC and SciELO, the two largest indexation systems in the region, have been able to provide extensive XML marking, thanks in part to public funding, in the first case from the Mexican CONACYT *National Council for Science and Technology* and in the second case by the Brazilian CNPq *National Council for Research*). But even if adequate funding for every journal is not available, we must not refrain from fixing what we can now. The authors believe that training, particularly to explain how to correct common mistakes, could have an impact on the visibility and retrievability (both by humans and by automatic agents) of Latin American journals in the short term. This will help bring the region's science into the spotlight, and fulfill the

promise of Open Access to more students and researchers, no matter where in the world they might be.

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ANNEX I

8. ADDENDUM 1: NAMES OF EXAMINED JOURNALS (TOTAL JOURNALS = 123)

Argentina

AdVersus
Archivos argentinos de alergia e
 imunología clínica
Biocell
Dermatología Argentina
Equipo Federal del Trabajo
Foro Iberoamericano sobre Estrategias
 de Comunicación
Hologramática
Journal of Applied Economics
Journal of Computer Science and
 Technology
Psikeba
Rev. Argentina de Lingüística
Rev. De Investigaciones Agropecuarias
Revista de Ciencias Sociales
Revista de Economía Política de Buenos
 Aires
Telondefondo
Universitas
Urbe et Ius

Brazil

Afro Asia
Boletim do Instituto de Pesca
Brazilian Administration Review
Brazilian Journal of Biomotricity
Caderno espaço feminino
Caderno Virtual de Turismo
Contingentia
Data Grama Zero
Economia e Energia
Educação Temática Digital
Engenharia Ambiental
Hegemonia
Klepsidra
Online Brazilian Journal of Nursing

Relações públicas em revista
Revista brasileira de educação médica
 (Online)
Revista Brasileira de Zoologia
Revista de Estudos da Religião
Revista de Gestão da Tecnologia e
 Sistemas de Informação
Revista Eletrônica de Estudos
 Hegelianos
Revista Expectativa
Revista Matéria
Semina

Chile

Agenda Pública
Ciencia y Trabajo
Cinta de Moebio
Cuadernos de Economía
El Vigía (Santiago)
Electronic Journal of Biotechnology
Journal of Technology Management
 and Innovation
Monografías electrónicas de patología
 veterinaria
Política Criminal
Rev. Chilena de Semiótica
Rev. Electrónica de la Sociedad Chilena
 de Ciencia de la Computación
Revista Universitaria

Colombia

Acta Biológica Colombiana
Colombia Médica
Cuadernos de Administración
Earth Sciences Research Journal
Livestock Research For Rural
 Development
Nómadas
Rev. Ciencias Humanas

Rev. Latinoamericana de Ciencias
 Sociales, Niñez y Juventud
 Revista EIA Ingeniería Antioquía
 Revista E-mercatoria
 Revista Escuela Colombiana de
 Medicina - ECM

Costa Rica

Diálogos
 MHSalud
 Población y Salud en Mesoamérica
 Reflexiones
 Rev. Actualidades Investigativas en
 Educación
 Revista de Derecho Electoral

Cuba

ACIMED
 Fitosanidad
 Multimed
 Revista cubana de investigaciones
 biomédicas
 Revista Cubana de Obstetricia y
 Ginecología
 Revista cubana de pediatría

Ecuador

Gaceta Dermatológica Ecuatoriana
 (Ecuador)
 Universidad-Verdad (Ecuador)

Mexico

Acta Médica Grupo Ángeles
 Alegatos
 Aleph Zero
 Anales del I.Biología, Serie Zoología
 Archivos Hispanoamericanos de
 Sexología
 Biblioteca Universitaria
 Buenaval
 Computación y Sistemas
 Cuadernos de Psicoanálisis
 Dugesiana
 Educar
 e-Gnosis
 El Psicólogo de Anahuac
 Hitos de Ciencias Económico
 Administrativas

InFÁRMate

Investigación Bibliotecológica
 Journal of Applied Research and
 Technology
 La pintura mural prehispánica en
 México. Boletín informativo
 Los amantes de Sofía
 Mensaje bioquímico
 Nueva Antropología
 Redes Música
 Rev. Ciencia Veterinaria
 Revista Biomédica
 Revista de Enfermedades Infecciosas en
 Pediatría
 Revista de la Educación Superior
 Revista del Instituto Nacional de
 Cancerología
 Revista Mexicana de Física

Peru

Biblios
 Diagnóstico
 Escritura y Pensamiento

Puerto Rico

Ceteris Paribus
 El Amauta
 Rev. Int. Desastres Naturales,
 Infraestructura Civil
 Videoenlace Interactivo

Uruguay

Actas de Fisiología
 Boletín Cinterfor
 Boletín del Inst. de Inv. Pesqueras
 Galileo

Venezuela

Acción Pedagógica
 Boletín Antropológico
 Cayapa
 Música en clave
 Postgrado
 Rev. Ingeniería UC
 Revista de la Sociedad Médico-
 Quirúrgica del Hospital de
 Emergencia Pérez de León

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