A TERMINOLOGICAL “JOURNEY” IN THE GREY LITERATURE DOMAIN

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SUMMARY

- Scenario & Objectives
- GL Corpus and Method
- Terminological Analysis
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- Conclusions
When we read the articles or papers of a particular domain, we can recognize some lexical items in the texts as technical terms. In a domain where new knowledge is generated, new terms are constantly created to fulfill the needs of the domain, while others become obsolete. In addition, existing terms may undergo changes of meaning...” (Kageura K., 1998/1999).

This work analyzes a corpus constituted of the entire amount of full research papers published in the GL conference series over a time span of more than one decade (2003-2014) with the aim of:

- making a “journey” in the Grey Literature (GL) domain in order to offer an overall vision on the terms used and the links between them;
- creating a terminological map of relevant words;
- analyzing the terminology used in the GL conferences for describing the various types of documents.
This section is split up in four steps:

• creation of the corpus by acquiring the digital papers of GL conference proceedings (GL5 – GL16);

• data cleaning;

• data processing using the NLP “pipeline” tool;

• terminological analysis and comparison.
GL CORPUS AND METHOD

- **Creation of the GL Corpus:**
  made of 231 research papers (for a total amount of 785,042 tokens: monograms, bigrams and trigrams);

- **Data cleaning:**
  only the body of the articles have been taken into exam (i.e., headers and references have been eliminated);

- **Natural Language Processing (NLP):**
  data was processed using a tool for terminological extraction, a sort of “pipeline” (that is, a sequence of different tools) which extracts lexical knowledge from texts. This tool extracts a list of single (monograms) and multi-word terms (bigrams and trigrams) ordered by frequency with respect to the context.
GL CORPUS AND METHOD

Terminological analysis:

1. Identification of the monograms of high, medium and low frequency within the glossaries provided by the extraction. This step gave us an overview of the single terms used in the papers. The study of the terms grouped according to their decreasing frequency allowed us to:
   
   a) select some of the most frequently used terms;
   b) examine the co-occurrences: bigrams and trigrams;
   c) determine the variations between them.

2. analysis of the terminology extracted from the corpus in relation with the conferences’ topics by retrieving the frequency peaks of the chosen terms and then verifying when they occurred.
In Tables 1 and 2 we grouped - respectively - the terms of the highest and medium segment of each GL Corpus.

For frequency segment of vocabularies we mean the organization of the words for decreasing frequencies, starting from the word with \( \text{freq}_{\text{max}} \) and coming to those with \( \text{freq}_{\text{min}} \), usually with only one occurrence (hapax).

Table 1. High segment
The results is that the highest percentage of terms is found in the lowest frequency segment: this applies to all GLs’.

The GL16 and GL6 glossaries stand out for the substantial amount of terms in the highest segment while the medium segment can be allocated to GL5 followed by GL14.
The mapping starts from the observation of the term that occurs most frequently in the entire corpus, which is “information”, and the two terms more closely related to the context, “grey” and “literature”.

Graph 1 shows that the terms “grey” and “literature” have the highest frequency in GL6 (2004) and the lowest in GL15 (2013), while the term “information” has the highest in GL15 (2013) and the lowest in GL12 (2010).
As expected, the bigram “grey literature” is the most used (2816 occurrences in the corpus) while the bigrams “grey material” (66 occurrences) and “grey document” (98 occurrences) are not present in all GL proceedings and their frequencies are much lower ...

The most common bigrams with the term “information” are in GL15: “Information object” is the top term (39 occurrences) while the bottom is “Information retrieval” (17 occurrences in GL14).

As trigrams: we have “Open Source Information” as top term with 228 occurrences and “Heterogeneous Information Object” as bottom term with 56 occurrences...
Given the size of the corpus and its chronological extension, the terms have been selected according to their technical nature and mainly with respect to a very dynamic and cross field: Information and Communication Technology – ICT.

Graph 2 shows the trend of the selected terms over the years: it is clear that – with the exemption of “indexing” and “dataset – all of them are occurring in each GL glossary.

Generally, there are monograms which seem to be constantly used and therefore their trend over the time is stable (e.g. “access”, “database” and “digital” ) while the vast majority of terms alternate high and low frequency peaks.
Graph 3 shows the total amount of occurrences for each selected monogram.

**Highest number of occurrences:** “access” (1928)

**Lowest number of occurrences:** “dataset” (196)

Amongst the highest, also “system”, “repository”, “open” and “digital” can be spotted.
The analysis starts from one of the most versatile adjectives of the corpus: “DIGITAL”.

The nouns, verbs and multi-word expressions (MWEs) combined with the term “digital” immediately disclose the technological nature of GL community: infrastructure, platform, system, software, network.

The occurrences “digital humanities” and “cultural heritage” characterize the fields of knowledge which usually require an expertise crossing between computer science and human and social sciences.
TERMINOLOGICAL ANALYSIS – Selection of terms: “digital” (bigrams & trigrams)

Among bigrams: "digital library" appears in 2005 (GL7). The community does not ignore themes such as “digital preservation” which appears in 2013 (GL15) and even uses the trigram “digital preservation practice”.

Among trigrams: “digital library platform” has the highest frequency in 2004 (GL6). In 2005 (GL7) “digital library service” can often be found and appears as “thematic digital repository” in 2012 (GL14).

Within 2004 (GL6) and 2005 (GL7) glossaries, “digital” displays the highest frequencies in the two forms “digital library” and “digital library platform”.

Since GL13 the expression “digital repository” tends to substitute “digital library” though it does not have the overall meaning of handling of a document life cycle which “digital library” implies.

Since 2011 this terminological shift reveals new demands for identification, accessibility, interoperability and reuse of the scientific data the repositories host as well as the need of ad-hoc services for those specific contents.

As for bigrams and trigrams: “digital library” and “digital library platform” are the most frequent MWEs;

Some lower occurrences:

“infrastructure”, “platform”, “system”, “software”, “network” show the technological nature of GL community;

“digital humanities” and “culture heritage” spot activities crossing human/social sciences and computer science.

Graph 4. “Digital” – bigrams & trigrams
“METADATA”
It can be found in all GLs in the medium segment and in the high segment already in GL6 and GL7, when discussion on standards and document management start appearing;

As for bigrams and trigrams, “metadata” comes with nouns and adjectives which highlight the importance in the Digital Library field:
“navigational metadata”, “descriptive metadata”, “metadata format”, “metadata harvesting”, “formal metadata”, “metadata schema” ....

In 2005 (GL7) there are topics on “Right management metadata” and “preservation metadata” and administrative metadata”.
In GL7 and GL10 the term is associated with specific standards such as Dublin Core and Cerif.
“QUALITY”
Since 2004 (GL6) there is the necessity of testing the quality of information available on the web and the term can be found:

as a **bigram**:
“quality assessment”, “quality control”, “quality information”, “quality performance”

as a **trigram**:
“metadata quality control”, “quality assessment metadata”, “high-quality information” and “metadata quality certification”.
The flow of themes discussed in these years is represented by the topics appearing in the twelve Call for Papers. Therefore some terms have been selected and then analyzed in relation to the topics of all GL conferences following two steps:

- retrieval of terms with the highest frequency;
- their comparison to the conference topics.

Graph 7 shows that the frequency peaks are limited to the GL6, GL7, GL10, GL12, GL13, GL14 and GL15 editions while the other conferences are excluded. Highest peaks are in:

- GL7 with the term “access” and
- GL13 with “repository” and “social”
The term “repository” can never be found amongst the topics of the conference in its singular form.

It is very common in the plural form “repositories” since GL6 and then in GL7, GL8, GL10 and GL11.

“Repository”, together with “dataset”, “network” and “social” are the terms with the highest number of occurrences in the GL13 when the conference topics were: “Social Networking”, “Special Collections”, “Open Access” and “Wealth Creation”, “Data Frontiers”. Although we found the topic “Social Networking” only in 2011 (GL13), this bigram is in use since 2005 (GL7) and the monogram “social” is steadily used since 2003 (GL5).

In GL8 the multi-word expression "social network" appears, as a neologism, in the GL lexicon.
GL CONFERENCE TOPICS: database and metadata

The highest number of occurrences of the terms “digital”, “database” and “metadata” is in GL6 (2004) which had the following topics:


It is interesting to notice that the monogram “database” never appears among the conference topics and “metadata” is to be found only once, in 2006 (GL8).

GL CONFERENCE TOPICS: open access

The bigram “open access” is a constant feature in the grey literature lexicon. It is used since the far GL5 (2003) in the two graphic variations “open access” and “open-access” that live together in some GLs.

We found three topics dedicated to “open access” in GL conferences:

“Open Access to Grey Resources”, “Open Access and Wealth Creation” and “Open Access to Research Data”.

The peak of the highest frequency is reached with “Open Access to Research Data” in 2014 (GL16).
The analysis of the terminology adopted for describing the types of documents started from the entries of the *Vocabulary of the types of Grey Literature* (2011) which has been considered the reference model.

It is though important to take into account the possibility that the terms extracted from the corpus do not necessarily describe the type of GL documents because it was not possible to automatically verify the actual correspondence between the term and its context.

An outstanding example is “journal” which can refer to the title of a publication ....
A few considerations from Graph 8:


- On the other side, some entries are **never** found in our corpus: “bachelor's thesis”; “call for papers”; “codebook”; “conference materials”; “conference proceedings”; “course text”; “exam topics”; “green paper”; “house journal”; “master's thesis”; “minutes”; “product catalogue”.

*Graph 8 – Types of documents retrieved in all GLs*
CONCLUSIONS (1)

This survey has been a sort of linguistic path in the past and present of the terminology used in GL proceedings with the goal of drawing a picture of the lexicon used by the GL community and thus contributing to get a deeper knowledge of the GL domain.

Many of the terms encountered cannot have synonyms because they reflect specific concepts devoid of the ambiguities peculiar to the common language. Some expressions such as “grey resources” and “open access” or nouns as “library” and “repository” refer straight and univocally to the “documentary science”, that is they belong to a specific semantic field.

By adopting a diachronic point of view, a significant terminological stability can be noticed: however, as expected, some terms have been pointed out as obsolete while others emerged as very up-to-date.

In these last twelve years we have witnessed the establishment of new paradigms of scientific communication, the stunning development of information technology and the creation of new infrastructures for storing, preserving and disseminating scientific information. A fact clearly comes to light from this analysis: through its technical and specialized terminology, the GL community shows to be sensible to technological innovation and willing to deepen the knowledge of some themes by reporting updates and novelties.
CONCLUSIONS (2)

The lexicon adopted in the GLs’ scientific papers has confirmed that the “grey” community paid soon specific attention to topics like “open access”, “repository”, “digital objects” and “preservation”, just to cite a few.

Examples could be endless and the need to circumscribe them is pressing: the complexity of this corpus analysis is truly given by its size and the consequent necessity to delimit some of its parts and pertaining taxonomies.

LASTLY, this work must be considered a preliminary analysis of the Gl corpus, a linguistic resource to be further investigated with different purposes and different tools.

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THANK YOU !!!!!