A Theory of Metadata Enriching and Filtering: Challenges and Opportunities to Implementation

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Abstract. This paper is informed by four years of research and 57 in-depth interview data analysis with practising librarians, researchers, metadata consultants and library users using a constructivist grounded theory method (Alemu, 2014). From the research, four overarching metadata principles, namely, metadata enriching, linking, openness and filtering emerged. The integration of these principles resulted in the emergence of a new theory of digital library metadata; The Theory of Metadata Enriching and Filtering. Within the context of current challenges, the theory stipulates that metadata should be enriched by melding standards-based (a priori) and socially-constructed (post-hoc) metadata, and that this cannot be optimally utilised unless the resulting metadata is contextually and semantically linked to both internal and external information sources. Moreover, in order to exploit the full benefits of such linking, metadata must be made openly accessible, where it can be shared, re-used, mixed and matched, thus reducing metadata duplication. Ultimately, metadata that has been enriched (by linking to other openly accessible metadata) should be filtered for each user, via a flexible, contextual, personalised and re-configurable interface.

The theory provides a holistic framework demonstrating the interdependence between expert curated and socially-constructed metadata, wherein the former helps to structure the latter, whilst the latter provides diversity to the former. This theory also suggests a conceptual shift from the current metadata principle of sufficiency and necessity, which has resulted in metadata simplicity, to the new principle of metadata enriching, where information objects are described using a multiplicity of users' perspectives (interpretations). Central to this is the consideration of users as pro-active metadata creators, rather than mere consumers. By providing underlying principles, this should enable standards-agencies, librarians and systems developers to better address the changing needs of users as well as to adapt to recent technological advances.

This paper summarises the theory emerged from the research and looks at the challenges and opportunities to implement the theory of metadata enriching and filtering in academic libraries.

Keywords: Metadata, metadata standards, Web 2.0, metadata principles, metadata theory, metadata enriching, metadata linking, metadata openness, metadata filtering

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1. Functional definition of metadata

Metadata supports users to find and discover information resources. In simple terms metadata is the combination of keywords you use to find a specific information resource such as a book, a journal article or just a piece of data (information). The richer the information resource is described with relevant, accurate, complete and user-centred metadata, the more efficient and effective your search could be. Metadata, which is defined commonly as data about data, is therefore central to libraries. The US National Information Standards Organisation (NISO, 2004) defines metadata as "structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource". By providing descriptive (author, title and subject), administrative (identity, provenance, rights, contextual and technical) and structural information (relations with other information objects), metadata plays an important role in digital libraries to support the findability and discoverability of information objects by users and also librarians.

Without metadata, the library's print and digital collection remain invisible to users. Not only is metadata essential for library resource findability and discovery but it also supports the circulation, acquisitions and interlibrary loans functions of a library. This explains why libraries continue to invest on cataloguing and metadata including for staff, discovery tools LMS software, tools and bibliographic services. According to Zeng and Qin (2008, p. 3) metadata is "the invisible hand" that serves users to find information.

To these purposes, cataloguers use metadata standards, systems and tools. Cataloguers also work with systems librarians to ensure catalogued information resources are properly displayed on discovery services. They measure their success through various indicators including the completeness, up-to-date-ness, quality and usefulness of the metadata to users. These indicators should also tie-up with the overall aim of the library to meet users' information needs and improve customer satisfaction.

At present, libraries rely on bibliographic metadata providers such as Online Computer Library Centre (OCLC), Bibliographic Data Services (BDS), the British Library and others. Libraries use cataloguer-created/curated, standardised and authoritative metadata. Whilst this is relevant, the standardised view of metadata may not necessarily capture user metadata. The theory of metadata enriching and filtering espouses that metadata should be enriched through standardised and socially-constructed metadata approaches. Even though some of the limitations of the card catalogue are obviated due to the use of OPACs and new tools such as discovery services, the metadata creation process remains the same. Hence, metadata enriching remains to be problematic. As Weinberger (2005) notes "when it comes to searching, what a work means to the searcher is far more important than the author's intentions", thus arguing for a more user-focused metadata.

The metadata creation and enriching process happens at various stages of the information resource life cycle. In theory, metadata creation and enhancement (metadata enriching) is a continuous process and it involves authors, publishers, suppliers, librarians and users. Unfortunately in current practice, users are not

allowed to add metadata. This is partly due to assumptions that user metadata is devoid of good quality, its management is problematic and there are no reliable platforms/tools to handle it.

As the size of collections in libraries grows, cataloguers increasingly find it difficult to describe every information resource in a manner that reflects the terminologies as used by users so as to therefore achieve optimal discoverability. With the development of the Web 2.0 paradigm, new opportunities arise to involve users in the metadata creation process.

2. Standards-based metadata approaches

Current metadata approaches are based upon agreed principles, including the principle of sufficiency and necessity, the principle of user convenience, the principle of representation and the principle of standardisation. Most of these principles result in metadata schemas with fewer metadata elements, which in turn results in metadata simplicity. Most of these principles are built on assumptions that standardisation provides efficiency in metadata creation and management. The focus on standardisation is also hinged upon the assumption that metadata conformance and uniformity (through controlled vocabularies and encoding schemes) would bring better interoperability and metadata sharing.

However, their scalability to the ever increasing collections in libraries is considered limited. Whilst standards in principle aim to provide structure, granularity and interoperability, contemporary formats fail to materialise them in practise. Currently, standards-based approaches are confronted with challenges such as non-machine-process-ability, lack of integration and interoperability with external non-library metadata, metadata duplication, slowness in accommodating users' needs in terms of user vocabularies (search terms) and lack of engagement with users. Some of these challenges can be addressed through technical means, such as changing library metadata formats from MARC to web-compatible formats, others are conceptual and yet others are social and institutional.

3. A priori metadata

When it comes to the process of metadata creation, it is important to bear in mind that present-day metadata standards implicitly presume that authors create works, that librarians create metadata and that users access information objects. Hence, standards-based metadata is predominately generated a priori, i.e. before users get access to a particular information object, such as a book.

In other words, the sequence of steps is as follows: librarians acquire an information object, describe it with metadata based on a given schema (or acquire metadata from third party suppliers, such as Online Computer Library Centre, Inc. (OCLC), who prescribe to the same rules and regulations) and finally make the information object available on library shelves or in electronic databases so that users are able to access and utilise it

Whilst standardisation and expert created (controlled) metadata has its benefits, it fails to adequately represent the diversity of views and perspectives that exist in library users. Hence, standards-based metadata approaches have come under

criticism for being rigidly hierarchical and authoritative (Alemu, Stevens, & Ross, 2012b; Shirky, 2005; Weinberger, 2007). Current metadata principles exhibit limitations in light of changing users' needs, the existence of multiple interpretations and changes in technological trends, such as social media and Web 2.0. It is thus important to look into how these issues can be addressed.
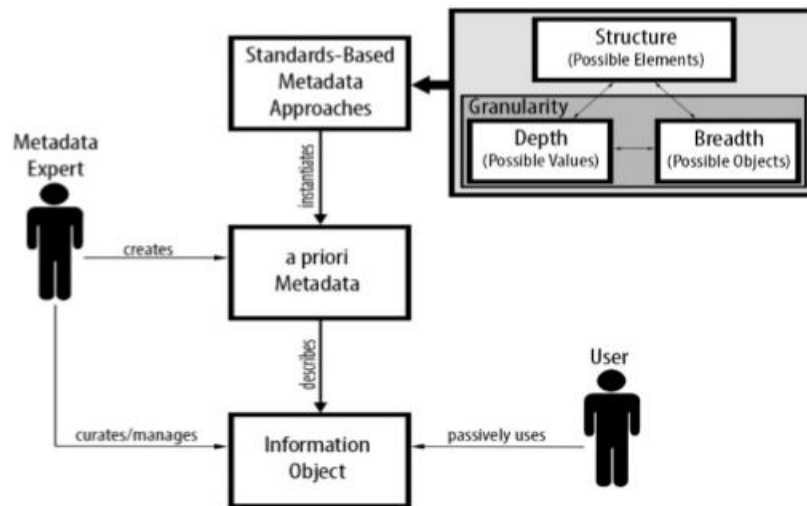
Figure 1. Standards-based, expert-created metadata approach

4. Socially-constructed metadata

Though Web 2.0 applications are popular, they are not without their limitations. Such limitations include: the lack of quality control of the tags, idiosyncratic and personal tags (such as 'to be read', 'to buy' or 'gifts from mum') and lack of structural hierarchy (broader/narrower/related terms) (Guy, 2006). For example, as used by the Flickr application, the term 'Apple' can refer to any edible fruit, the Forbidden Fruit in the Bible, a computer brand, or an abbreviated form of the place known as Apple Valley, or Apple Records. In general, the issue is with potential metadata quality.

Conversely however, single, ontologically true, metadata descriptions do not reflect the diversity of metadata inherent in users. However, carefully and meticulously crafted, the cataloguer could only provide a single interpretation of information objects. Knowledge's fluidity and varying users' metadata needs makes it difficult, if not impossible, to provide such objective description to books and other information objects. By their very nature these information objects can convey different meanings for diverse user groups, and hence can be interpreted variously. Put simply, human beings are highly unlikely to agree on a singular, top-down and hierarchical classification of objects. This is especially so now, with recent developments such as the shift towards web-based publishing media such as Wikipedia, the spread of social tagging and the

adoption of social networking applications, an overwhelming move towards the acceptance of disparate points of views and negotiated meanings.

The construction of metadata is highly influenced by socio-cultural constructs such as language, education, context of use and personal interests. This thus suggests the importance of similarly adopting a social-constructivist and interpretivist approach to metadata, rather than the traditional objectivist ontology. This accords very well with the Web 2.0 paradigm. However, current adoption of the Web 2.0 paradigm focuses at the application level whereby specific third party applications such as Flickr, LibraryThing, Delicious and GoodReads are adopted as add-on without the full consideration of the concepts that underpin these applications (Farkas, 2007). Thus currently, for metadata, the emphasis is on tagging (Smith, 2008; Weinberger, 2005, 2007). This narrows the application of Web 2.0.

Thus, the concept of socially-constructed metadata is proposed here, as it better reflects not only tagging but also the incorporation of other facets of user-created metadata such as user reviews, ratings and recommendations, along with a recognition that this requires more than one user, i.e. collective intelligence (O'Reilly, 2005).

In this context, it is important to note that in the early 1930s, Paul Otlet espoused the importance of incorporating the social space of documents as part of the library cataloguing system. However, Paul Otlet's vision of the social space of documents has not yet been fully realised.

5. Post-hoc metadata

Instead of passively using metadata to find and discover information objects, users can in fact assume the role of adding metadata through various mechanisms as afforded by the Web 2.0 paradigm. For the sake of comparison to a priori metadata (before publication of an information object), the metadata created by users can be referred to as post-hoc metadata (after publication of an information object).

6. Mixed metadata approach

A mixed metadata approach is suggested where it supports the inclusion of the multiple interpretations by users (post-hoc metadata) of information objects so as to augment or improve metadata created by library experts (a priori metadata). In the light of mixed metadata approaches where socially-constructed metadata approaches can be implemented by involving users in metadata creation and management process, the principle of sufficiency and necessity can be re-considered. The impetus for socially-constructed metadata approaches is the underlying conceptual and technical infrastructure of the Web 2.0 paradigm. The paradigm presents a new opportunity for libraries to implement a viable platform for metadata co-creation, which in turn decreases marginal costs of metadata generation (through distributed inputs and reduced metadata storage costs).
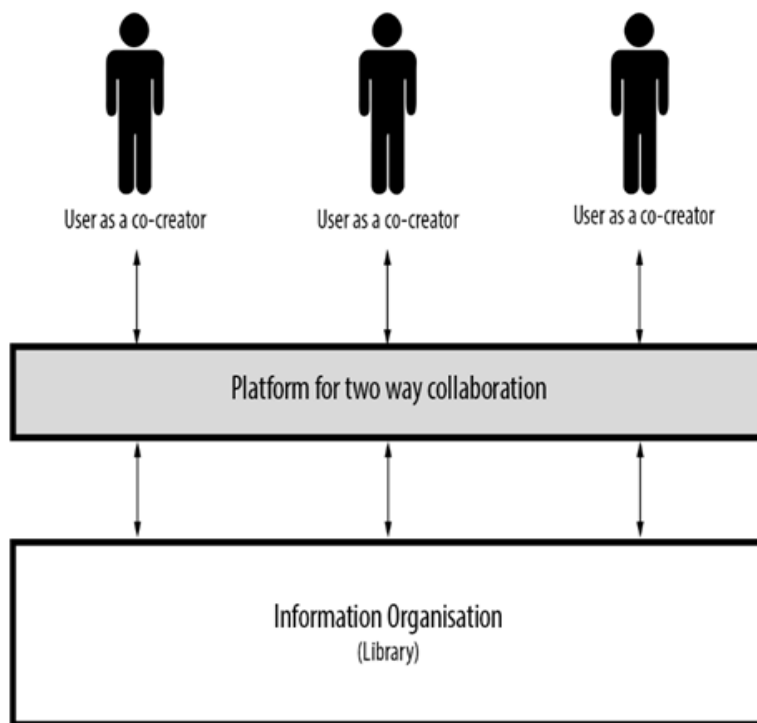
Figure 2. Socially-constructed metadata

It can be argued that the concern of metadata cost minimisation, which underpins the principle of sufficiency and necessity, is partly obviated through the use of a mixed metadata paradigm and its associated technological trends.

However, to full take advantage of the platform for co-creation, each information organisation should not necessarily re-create metadata that has already been created by another institution. In the same way controlled vocabularies exist in a modular form, enriching can be a process of using existing metadata. Metadata re-use also allows an organisation to commercially leverage their own metadata. However, to both re-use and supply metadata, the data needs to be linkable.

Four metadata principles emerged, namely, metadata enriching, linking, openness and filtering, is suggested. Thus, by providing a holistic theory and demonstrating the interdependence between these principles, this theory posits an emergent metadata theory, which is considered to have wider implications in the way metadata is created, utilised and managed in libraries. This results from the suggested benefits of a mixed metadata approach, where the case was made that a priori metadata and post-hoc metadata are considered complementary to each other.

It should be noted that, in light of a mixed metadata approach, the consideration of socially-constructed (post-hoc) metadata for enriching standards-based (a priori) metadata assumes an interpretative ontological point of view, wherein multiple interpretations can be ascribed to an information object, as opposed to the objectivistic ontology of contemporary standards-based approaches.

7. Integrating the four principles

The principle of metadata enriching implies a continuous process of adding, augmenting and improving expert-created (a priori) metadata with user-created (post-hoc) metadata. The latter provides the diversity and breadth of interpretations of information objects, whilst a priori metadata serves as a focus for presenting basic structured, standards-based, metadata to users. Once users get access to information objects using a priori metadata, they can start enhancing it using their own terminologies, interpretations or descriptions. Enriching is thus characterised by a constant flux. Enriching can be contrasted with the current metadata principle of sufficiency and necessity, which focuses on creating simple metadata in a 'complete state'.

Whilst it is technically possible that libraries can implement the principle of enriching within their own institution, it can only be effectively and efficiently implemented if another principle, the principle of metadata linking, is embraced and implemented. The principle of linking enables libraries to continually enrich their existing metadata with metadata that resides outside their boundaries. Metadata that is linked, both with internal and external data sources, results in interlinked metadata, thus offering users the ability to seamlessly navigate between disparate information objects. The principle of metadata linking ensures that metadata values are granularly structured, uniquely and persistently identified and interlinked, thus, bringing together disparate metadata sources. However, in order to realise metadata linking, the metadata that is to be linked-to must be made openly accessible. The principle of metadata openness makes explicit that institutions communally benefit from making their metadata available in an open, re-usable and re-combinable format. Whilst there can be various degrees of openness, the highest degree of openness where metadata is open, machine process-able and interlinked provides the greatest benefit, in terms of opportunities for re-use.

The principles of enriching, linking and openness are interdependent, however, the latter two can be considered as subsumed under the former. For the two principles to be effectively utilised, a higher goal of the principle of enriching should be first put in place. As a consequence of enriching being a broader goal, the principles of linking and openness are considered as required components of metadata enriching.
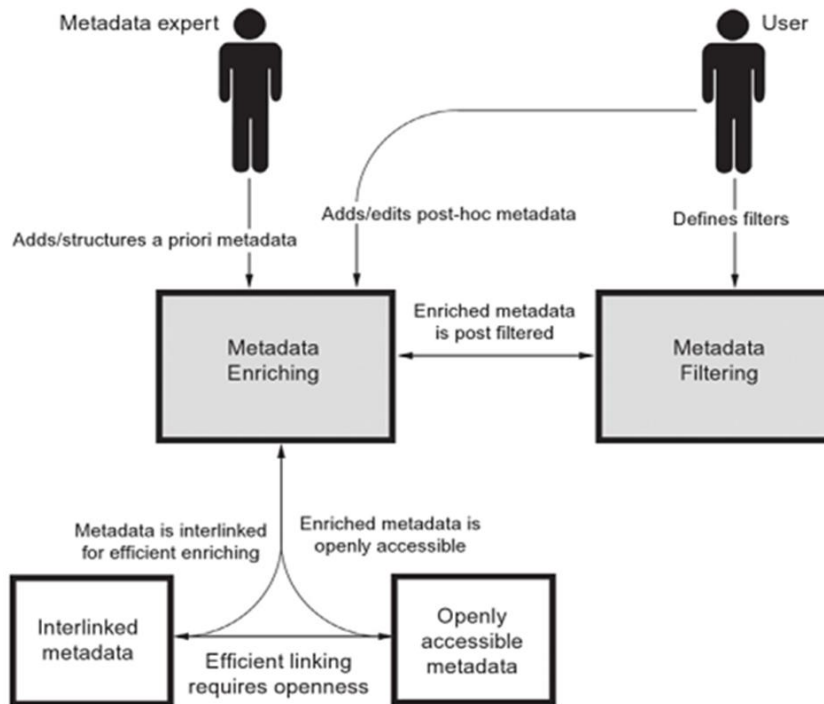
Figure 3. Principles of Metadata Enriching, Linking, Openness and Filtering

The interdependence and subsequent integration of the three principles resulted in the overarching principle of enriching. The principle of metadata enriching is bound to result in a great volume of metadata. Thus, without appropriate filtering, metadata enriching would become more of a problem than a solution. Unless properly filtered, the sheer volume of metadata presented to users on discovery interfaces (such as OPACs), may hamper the findability of information objects, as users find navigating through the retrieved mass of results difficult (interface) or time consuming (quantity). This is where the principle of filtering plays a crucial role. Thus, through these overarching principles the Theory of Metadata Enriching and Filtering emerged.

The theory of metadata enriching and filtering places users at the centre of the metadata creation process. Whether it is created by the expert or users themselves, the chief purpose of metadata is to support findability and discoverability of information resources. Hence, anything that supports this argument should be positively considered by librarians and LMS developers.

8. Separation of metadata content (enriching) and interface (filtering)

It is important to make a vital distinction between enriching and filtering. Whilst enriching solely deals with metadata content, filtering addresses all issues associated with its presentation (interface). The former is about complexity and the latter is about simplicity (display) and efficiency (metadata view). Metadata presentation is a usability issue and thus should not be conflated with enriching of metadata content. In the emerging metadata paradigm, the challenges that arise in presenting the sheer volume of metadata are addressed by the principle of filtering. Current principles mistakenly assume to achieve simple presentation of metadata (i.e. metadata simplicity) through reducing the number of metadata fields by applying "Occam's razor" (Principle of Sufficiency and Necessity). The theory suggests that metadata that is enriched should be presented to the user in a simple, usable, sensible and meaningful manner based on what they want to see and how they want to see it. Whilst the principle of enriching results in a potential abundance of metadata, the principle of filtering is used to simplify its presentation by enabling a user-centred/focused/led design.

9. Enriching as a continuous process

The theory of metadata enriching and filtering recognises the importance of capturing user-generated metadata and continually improve and enhance it. Metadata enriching is thus considered a continuous process. It does not aim to anticipate future metadata needs based on a priori metadata. Instead, it uses a priori metadata as a starting point for users to continually enrich existing metadata. Using a priori metadata as an underlying structure allows users to add more metadata and, as a result, create a collective metadata intelligence. Through a mixed metadata approach, the principle of enriching enables libraries to identify the zeitgeist and resource usage patterns of library users, by monitoring the continual re-structuring and enhancement of metadata. Hence, librarians can continually improve the structure, granularity, provenance and interoperability of metadata). A non-deterministic view of enriching and filtering thus records user preferences post-hoc rather than attempting to anticipate users' needs, hence changing how users are reconceptualised.

10. From user-centred to user-driven metadata enriching and filtering

Librarians have grappled with the question of objectively ascertaining users' requirements through surveys, interviews and feedback forms. However, the answers thereby obtained make library metadata user-centred but not user-driven, the latter being a more desirable outcome. Only direct involvement, in the creation of metadata on the part of users, can assure that metadata is indeed truly user-driven. User-driven metadata enriching empowers users to be proactive creators, collaborators and partners. In the new metadata paradigm, users co-own the metadata. They can participate not only in the co-creation process, but also in its management and curation. Since the main objectives for affixing metadata to information objects it to enable its discoverability, metadata

should be judged by its relevance in meeting this aim, rather than the way it depicts an information object in an objective and ontological manner. This is important as terminologies change over time, hence, the metadata should be able to be cognisant of and reflect such changes. Enriching is thus better conceptualised as an action rather than a state.

11. Enriching as a continuous process

In contrast to creating a priori metadata in a 'complete state', enriching is a continuous process of adding, enhancing and improving metadata content. Benefiting from a network effect where each contribution slowly aggregates, enriching aims to collect as much metadata as possible, thus facilitating metadata diversity.

All interpretations are valid. Thus any user can add anything at any time, provided that such metadata assertions are not malicious. As new users join the network, the metadata becomes further enriched. However, with new conversations taking place regarding a given information object, its interpretation has the possibility to continuously evolve (change) rather than simply refine (consistency). Enriching is a never ending and constantly evolving process. However, this evolution will better match changing user needs.

12. Metadata diversity better conforming to users' needs

Metadata diversity implies the inclusion of a multitude of potentially conflicting metadata ascribed to information objects by users, to support the multitude of perspectives and interpretations of various groups of potential users. In relation to idiosyncratic (personal) metadata entries, it is important to recognise that a given metadata entry that might be considered trivial for a general user might be important for the one who created it, since it is likely that the latter will search with those keywords. Such idiosyncrasy can be managed by providing personalised presentation, which can be managed through appropriate metadata filtering.

More broadly though, the new metadata paradigm does permit the inclusion of metadata descriptions (interpretations) of information objects that may seem in opposition. In such instances, it is important that the diversity of the various interpretations is maintained. Nevertheless, it should not include random entries; instead, it should cater towards semantic and meaningful metadata whilst at the same time maintaining the diversity of interpretations. This should however be supported by ubiquitous interlinking.

13. Seamless linking

At present the links to metadata on an OPAC display can only go up to a certain extent and soon reach a dead end, when a data item is not linked any further. For example, current metadata interfaces allow a user to search for a specific book, click on the author's name and see their publications and, maybe, find related/similar books. They, usually, do not offer a seamless link to the author's biographical page or from there to another page, such as one on Wikipedia or Google Books, which cites them and then back to the library listing.

The Theory of Enriching and Filtering posits that metadata that is enriched with links would give endless possibilities to explore and discover information objects. Potentially, every metadata value can be linked in a similar way as words and phrases in a dictionary can be linked, thus users can select any word and retrieve the meaning of it. Likewise, users can select any metadata link retrieving information objects associated to that metadata value. For links to be ubiquitous, metadata openness is essential so that linking to external sources can be effectively implemented.

Metadata openness has far reaching consequences for the way metadata in libraries is created, accessed, shared and re-combined. If library metadata needs to be made re-usable and shareable, it should be represented in open formats and should be made available in flexible licensing schemes that allow not merely cost free use but support for adaptations and commercial uses. Furthermore, the linking must be designed in such a way that it does not provide barriers to users, i.e. seamlessly integrated.

The Theory of Enriching and Filtering suggests an integrated approach to metadata linking. At present metadata linking is considered in isolation to the processes of metadata creation and filtering. Thus users are forced to search various disparate databases within a given library. However, seamless metadata linking eases the navigation between various information sources without the user necessarily making extra effort to stop one database and start another. The need for seamless linking is especially apparent in the light of emerging user behaviours to traverse across information sources, sifting through relevant information and the current need to manually triangulate information from disparate sources. Thus, the principle of metadata linking is bound to entail that multiple agencies will need to work in close cooperation, for example when assigning unique and persistent identifiers to metadata.

Potentially, every metadata value can be interlinked, thus users can select any metadata link retrieving information objects associated with that metadata value. Seamless linking is thus considered essential to achieve the overall goal of enriching, however the linking should be contextual and relevant to the user.

14. 'Useful' rather than 'perfect' metadata

The theory suggests the importance of re-conceptualising the notion of metadata quality, stating that in a mixed metadata approach the issue of metadata quality should be weighed in light of the relevance of metadata to support findability and discoverability. Further, it is metadata's usefulness for finding and discovering information objects, rather than on whether it is objectively accurate (truthful) or not, or on whether it is 'good enough', rather than on whether it is 'perfect metadata', that should be considered. The Theory of Enriching and Filtering considers all users as potential metadata creators. As a result, it is likely that good as well as erroneous, or malicious, metadata may be added into the system. Due to the sheer volume of metadata entries, it is not possible for librarians to ensure the quality of metadata in terms of consistency. However, it is important that the notion of metadata quality in libraries is re-conceptualised

from mere consistency to diversity. Thus, functional requirements of metadata should weigh over objective interpretation of the author's intentions.

15. Post-hoc user-driven filtering

The principle of metadata filtering emerged as one of the most important principles. The principle suggests the importance of re-conceptualising current metadata interfaces from a single expert-filtered and consistently displayed metadata content description to a contextually relevant, re-configurable and user-driven interface. This post-hoc filtering is thus both user-led and user-focused, thus better addressing users' diverse needs and requirements than traditional (expert-led/single display) interfaces. The principle offers flexibility and facilitates serendipitous discovery of information resources. However, in doing so, it should also be noted that this does not preclude filtering metadata so that only current standards-based, objectivist, metadata is used and presented in a standard OPAC as this may be what the users need.

16. From theory to practice: challenges and opportunities at Southampton Solent University

In what follows, I try to highlight the challenges and opportunities to implementing the theory of metadata enriching and filtering. Currently, I am working as cataloguing and metadata librarian at Southampton Solent University where we catalogue print and electronic information resources such as books, e-books, databases and DVDs. Through cataloguing new materials and maintaining library databases and discovery services, we provide seamless access to resources for research and study.

We use BDZ as our main supplier of bibliographic data using Z39.50 protocol. The records can be imported to the cataloguing module of the library management system and which can then be amended as needed. Obviously, this not only helps to standardise our metadata but also saves cataloguing time. However, a lot of customisation has still needs to be made in-house including the creation and application of local subject keywords, creating a brief summary for each information resource and applying metadata fixes. In addition we ensure that new books are catalogued with the new Resource Description and Access (RDA) standard.

17. RDA implementation and implications

In line with the development of Resource Description and Access (RDA) as a new cataloguing standard replacing the Anglo-American Cataloguing Rules (AACR2), Southampton Solent University (SSU) Library has been actively following the changes and made a decision to implement RDA in an incremental fashion. As a result, SSU subscribed to the RDA Toolkit to gain full access to the principles, rules and documentation as well as cataloguing policies and workflows of other libraries (http://www.rdatoolkit.org/).

Based on this, SSU Cataloguing staff have been self-training themselves in the use of the new standard, developed workflows (MARC workflow and Solent monograph WEMI workflow), designed and tested templates

(BOOKRDA.MRC). Thus, at present implementation of RDA has already begun for print books, e-books and DVDs. Existing and old records created using AACR2 remain generally unaffected by the new standard thus no retrospective changes will be made to existing records. In addition, all other standards such as DDC23 (including Web Dewey) and USMARC (MARC21) along with local guidelines/procedures (such as SSU Dewey Schedules and local practices) will remain in use.

It is worth noting here that the major distinction between AACR2 and RDA is that the former was borne in a time when space on the card catalogue was a major issue, hence bibliographic description was simple, brief and abbreviated (such as ed., rev., vol., s.l., s.n., n.d. and et al), whereas now most of these limitations are obviated with the use of computer storage and displays, and hence the new standard (RDA) should also reduce or eliminate these restrictions. By eliminating AACR2's rule of three (statement of responsibility such as authors, editors), RDA aims to increase access points. When there exist more than two authors, the cataloguer can decide as to how many number of access points to add. In doing so, not only index terms are expanded but also RDA empowers the cataloguer. Even more important, RDA is designed with linking and collocating multi-part and related works together, providing thus a richer metadata description and display to the user.

In principle, RDA should enable cataloguers to create metadata in such a way that similar works by the same author or on a related subject can easily be brought together to the user. In comparison, AACR2 was very much focused on the item being catalogued rather than on similar other works.

The overall aim of RDA implementation at SSU should be geared towards enhancing the findability of information resources on the catalogue, providing discoverability, ensuring better user experience, meeting users' information needs and thus increasing the return on investment on the purchase of information resources (print books, e-books, databases and e-journals), and library management systems.

- RDA better complies with current web technologies (in line with FRBR, WEMI, FRAD theoretical framework and the use of relations and relationship designators);
- RDA enables to create metadata (a catalogue record) that better caters for finding, discovering, identifying, selecting and obtaining information resources;
- RDA is intuitive for cataloguers and helps to generate user-friendly bibliographic metadata, for example it avoids the use of abbreviations such as et al., ill., col., ed., s.l., s.n., n.d;
- It is expected that in the near future, as many book suppliers are aware of RDA changes, SSU is more likely to receive most of its bibliographic records in alignment with the new standard.

However, due to current limitations of Library Management systems (LMS), it is not always easy to demonstrate the full benefit of RDA especially in relation

to supporting metadata enriching, optimal discoverability and metadata linking. RDA is a theoretical model for the creation of bibliographic description, it is generally platform independent, hence it works well with Aleph and Primo. However, current library systems such as Aleph and Primo should be configured to reflect the required changes, hence benefiting library users from the real values added by the use of the new standard.

Most importantly, in relation to the theory of metadata enriching and filtering, RDA focuses on standardised, cataloguer created metadata rather than a mixed metadata approach where cataloguers create and maintain the basic metadata and structure and users continue to enhance and enrich metadata. On the positive side, RDA is link friendly and fields such as author, title, relationship designators and subject keywords can potentially be linked and thus create clickable metadata on the discovery interfaces. FRBR's Work, Expression, Manifestation and Item (WEMI) structure is also supported through RDA. Whilst we are aware of these benefits of RDA, in practice LMS pose severe limitations to implementation.

18. E-books metadata

The uptake of e-books usage at Southampton Solent University continues to surge year by year, as evidenced by the expenditure and usage. It is therefore important to ensure optimal discoverability for e-books. The metadata detail required for e-books is similar to that of print books except the latter requires URL, format and access/license information. The following is an example for an e-book catalogue record:

```
LDR   00000cam 22    i 4500
001   009680654
005   20160301114335.0
008   150902s2016   enka   s   001 0 eng d
020   |a 9781317275466 |q ebook
035   |a (OCoLC)0878116985
037   |a 895284 |b MIL
040   |a MyiLibrary |e rda
040   |a UkSoSU |b eng |c UkSoSU |e rda
043   |a e-uk-en |a e-uk-wl
05004 |a KD833 |b .B73 2016eb
08204 |a EBOOK
08204 |a 346.04
1001  |a Bray, Judith, |e author. |d 1954-
24510 |a Unlocking land law / |c Judith Bray. |h [electronic resource].
250   |a 5th edition.
264 1 |a Abingdon : |b Routledge, |c 2016.
300   |a 1 online resource (xxxii, 484 pages) : |b illustrations.
336   |a text |2 rdacontent |b txt
336   |a still image |2 rdacontent |b sti
337   |a computer |2 rdamedia |b c
338   |a online resource |2 rdacarrier |b cr
4901  |a Unlocking the law
504   |a Includes bibliographical references and index.
      |a This edition has been extensively rewritten and updated to include discussion of recent changes and
      developments within the module, including the issues arising from the decisions in Swift v 1st Ltd v Chief Land
      Registrar and Scott v Southern Pacific Mortgages Ltd and their implications in registered land cases. It also
5208  reviews the law of implied trusts post Stack v Dowden and Jones v Kernott . The books in the Unlocking the
      Law Series get straight to the point and offer clear and concise coverage of the law, broken-down into bite-size
      sections with regular recaps to boost your confidence. They provide complete coverage of both core and
      popular optional law modules, presented in an innovative, visual format.
588   |a Description based on print version record.
690   |a EBOOKS
690   |a LAW
690   |a PROPERTY LAW
690   |a EQUITY
690   |a LICENCES
690   |a MORTGAGES
690   |a COMMONHOLD
690   |a LAND LAW
650 0 |a Land tenure |x Law and legislation |z England.
650 0 |a Land tenure |x Law and legislation |z Wales.
830 0 |a Unlocking the law.
85640 |u http://lib.myilibrary.com?id=895284 |z Click here to access this ebook (Username and password required
      off campus)
85640 |u http://metalib1.solent.ac.uk/V/?func=find-db-info&doc_num=000004333 |z Click here for more information
      about MyiLibrary ebooks
908   |a 10
999   |a First made available on: |d 20160301
OWN   |a PUBLIC
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Figure 4. E-book metadata record on Southampton Solent University Library Catalogue

The keywords should reflect on what users use to search for this particular book. The local and Library of Congress keywords are clickable.

(Subjects: EBOOKS ; LAW ; PROPERTY LAW ; EQUITY ; LICENCES ; MORTGAGES ; COMMONHOLD ;LAND LAW ; Land tenure -- Law and legislation -- England ; Land tenure -- Law and legislation -- Wales)

For example clicking on the keyword COMMONHOLD would list all the resources catalogued with that phrase.

Currently, most e-books collections are stored at the supplier/publisher portals rather than in the university's servers. In terms of user-centred metadata, only few e-books platforms are user-friendly as most simply offer a print to electronic conversion with limited or no features to support highlighting, annotating, sharing, tagging and personalisation. For instance, some platforms simply offer the PDF version of the print book.
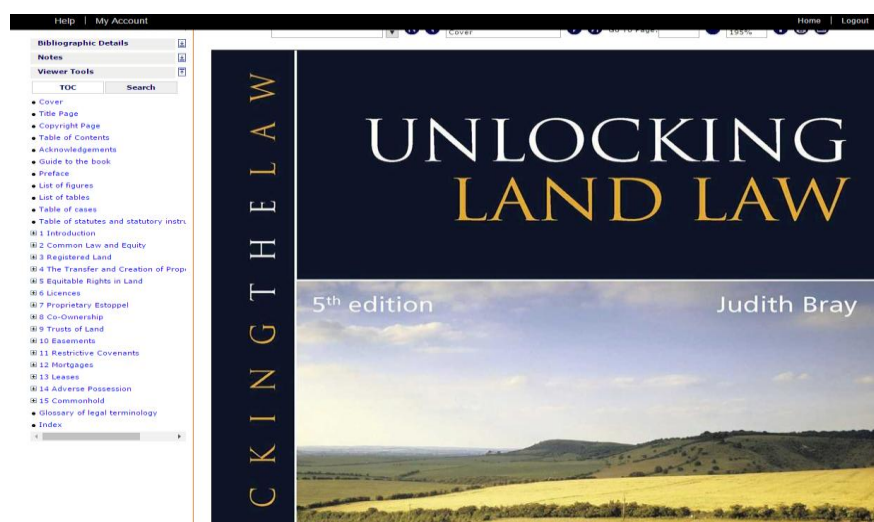
Figure 5. E-book page on MyiLibrary portal

Since users have no other alternative to browse around shelves, the metadata for e-books should be all the richer. E-books metadata should also be user-centred. By applying the principles of the theory of metadata enriching and filtering, discovery systems should push e-books to users' online work and study spaces through serendipitous discovery.

19. Linked Data opportunities

Linked Data is considered to be an important development for libraries. It offers a novel opportunity to improve library discovery services for users. However, like most other university libraries, Southampton Solent University has not yet implemented Linked Data. The current LMS in use is not web-based and is not yet compatible with the requirements of Linked Data. Among other things, the Linked Data model works on HTTP-based open protocols.

Some Library Management System (LMS) providers such as ExLibris are however considering to introduce Linked Data as part of their packages. This is evidenced by ExLibris' white paper where Sanders (2015) highlights on the implications of Linked Data and BIBFRAME for ExLibris. The white paper states that:

"The combination of the ExLibris Alma® resource management service and Primo® discovery solution enables Ex Libris to leverage the power of linked data to the benefit of libraries and end users and to support end-to- end services that are based on and can be enriched by linked data. The merging of services supplied by Primo with data supplied by Alma will empower discovery-system users as well as library staff with new and exciting possibilities, including richer metadata, enhanced workflows for technical services, improved search results, new ways to explore content, and more. In addition, third-party tools supporting linked data will consume linked data supplied by Alma, and Primo will supply services that are not based on Alma." (Sanders, 2015)

There are opportunities for Linked Data implementation but it may take a while until a stable LMS, metadata format and staff readiness are all put in place to support it.

20. Summary
The theory of metadata enriching and filtering argues for a mixed metadata approach, requiring an integrated approach of librarian-created and user generated metadata. The enriching (metadata creation) and filtering (presentation) should be delineated. The theory brings into focus the importance of involving users in metadata creation and the need to incorporate their terminologies to enrich information objects with a wide spectrum of perspectives and interpretations through social constructivist user collaboration. This will accrue to a richer metadata that reflects diversity, hence, making information resources more discoverable and usable, which is the ultimate aim of metadata. Metadata enriching does not simply mean having too much metadata. Enriching can only be achieved by melding both librarian created metadata with user-created/generated metadata hence incorporating the diversity inherent in users' terminologies.

Current standards-based metadata approaches are underpinned by the principle of metadata simplicity where the focus is no hence failing to represent the diversity inherent in users. As metadata is created by experts, users are considered as passive consumers. The metadata created tends to focus on the bibliographic details (author, page numbers, title subject and year) but not on the about-ness of the content. Such metadata can only be obtained from users. Metadata enriching is about metadata that is user-centred. The gerund verb in enrich-ing entails continuous enhancement hence it is a never ending process such that metadata is continually improved, adapted and re-purposed to fit the ever changing needs of users.

It is important to explore the market for a robust, open and link friendly integrated library management system which allows optimal discoverability for our print and electronic resources and services. We should aim not only to link within our collections but also to be able to enrich discovery interfaces with external resources.

I anticipate future LMS will support the principles of enriching, linking, openness and filtering. The transition should however be as smooth as possible

not to adversely affect current library services, including those reading lists which rely on reading lists. Most importantly, as we look forward, we should aim to involve users in the metadata creation process and ensure user-focused metadata.

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