

**An assessment of ERMI in the
context of ONIX and
requirements for recording and
communicating licence terms for
electronic resources**

An initial report to EDItEUR

Submitted to:	EDItEUR
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Version:	1.0
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1 Background

The migration of an increasing proportion of library resources to digital format is posing a number of challenges to the library community. The Digital Library Federation (DLF), a US library consortium, was established in the mid-1990s to provide a focus for seeking common solutions to some of these challenges.

As libraries have attempted to incorporate “electronic resources” into their collections, services and operations, they have found that existing integrated library systems lack the required functionality to support these resources. In response, in May 2002, the DLF set up their Electronic Resource Management Initiative (ERMI) to aid the rapid development of library systems by providing a series of papers to help both to define requirements and to establish data standards for the management of electronic resources.

As the number of the digital resources in library collections has grown, libraries have found it increasingly difficult to comply with the widely differing licence terms applied to different resources by their creators and publishers. Simply being able to express these terms in a simple form and communicate them to users has become a pressing need (regardless of what technical measures may be taken to enforce the terms). A major ERMI deliverable has been a list of rights-related terms and an XML-based schema for expressing these.

In common with other DLF deliverables, this specification has simple been “released”; the DLF have said that they have no interest in maintaining or developing this work any further. They are optimistic that a suitable Standards Setting Organisation (SSO) will pick up the work and move it forward in a more formal standards environment.

EDItEUR, the global trade standards organisation for the book and journal communities (including libraries, publishers, booksellers, subscription agents), has been developing the “ONIX” (Online Information Exchange) family of XML standards to support communication within these communities; specifically, the joint EDItEUR/NISO “ONIX for Serials” initiative has been exploring the requirements for communication between publishers, agents and librarians primarily as it relates to the management of ejournals.

A requirement to communicate unambiguously about licence terms within this supply chain has been identified; the question that this paper is designed to answer is the extent to which the ERMI work undertaken by DLF in this area might provide a basis for whatever EDItEUR might decide develop to support licence-related messaging.

It is important to underline that the work of the DLF has been limited to input from a single community, librarians. Like some other statements made in this document, this is not intended to imply any criticism of ERMI – it would be entirely unreasonable to criticise ERMI for not being something that its creators never intended it to be. It is inevitable that ERMI will not meet all EDItEUR's requirements for ONIX – it was not designed with those requirements in mind.

2 Scoping the requirements

In this context, we will well first to consider the scope and role of *Rights Expression Languages* (RELs). There are two well-known RELs – ContentGuard’s XrML (which is the baseline technology adopted for the MPEG-21 REL – ISO/IEC 21000-5) and IPR System’s ODRL (which is the baseline technology adopted as the Open Mobile Alliance’s Rights Expression Language).¹

Unlike a simple XML message, an REL message is effectively a piece of declarative programming – in other words, it describes to an application a set of logical conditions and then lets the application figure out how to satisfy these. RELs also require substantial functionality beyond that of an ordinary XML message, in terms of disambiguity, security and integrity of communication.

RELs are used to control *digital policy enforcement technology* (commonly called “Digital Rights Management”); this technology allows a resource provider to dictate remotely the conditions of use of an electronic resource.

Both RELs and DRM fall (for the most part, at least) outside the scope of our discussion in this document. The issue under consideration is not policy enforcement but the ability to communicate licence terms. However, there is one common issue to consider.

Any language requires semantics as well as syntax. In the case of the MPEG-21 REL, these are provided by the MPEG-21 Rights Data Dictionary (RDD – ISO/IEC 21000-6).² ODRL incorporates its own, relatively simple set of “rights” semantics.

The MPEG-21 RDD has been criticised for its complexity. This complexity stems from the fact that it is much more than a simple dictionary of terms – it is an ontology designed to create a framework for interoperability; in this respect it differs sharply from the “self-contained” nature of ODRL.

Interoperability in this context is, in our view, vital. The expression of digital policies³ does not happen in a vacuum. Terms drawn from any number of different metadata schemes may need to have interpretable and unambiguous meaning within a “rights expression”; any boundary between “descriptive

¹ In this context, it may be worth mentioning that the argument that XrML is “proprietary” while ODRL is “open” appears to be something of a red herring. Content Guard’s patent claims are based on earlier work on “DPRL” undertaken at Xerox Parc; if these claims are valid, the patent claims cover both XrML and ODRL – since they relate to any message used to control the actions of DRM technology (not the specific form of the message).

² A declaration of interest is clearly appropriate here. One of the authors of this paper is a co-editor of ISO/IEC 21000-6. Rightscom is also the owner of a share in the patent which underpins the standard. However, it should also be clearly understood there is also no proposal in document that EDItEUR or ERMI should in some way “adopt” or incorporate the MPEG-21 RDD.

³ We are reluctant to use the words “rights” in this context, since the one thing that RELs clearly do not express are Intellectual Property Rights (something which leads to frequent confusion). The policies being declared may indeed have their roots in intellectual property, but they may equally relate to commercial confidentiality, for example.

metadata” and “rights metadata” is entirely artificial. Therefore, we believe that any effective solution in this space will have to provide semantic interoperability as a cornerstone (unless we are all to accept a monolithic solution, across all media types and channels – something we would regard as inherently unlikely).

It is extremely difficult to interoperate effectively with a metadata scheme which is not based on a coherent, cogent and unambiguous data dictionary. Therefore, from the point of view of EDItEUR, we should be seeking a solution where semantics are unambiguous and well defined.⁴

However, a proper set of definitions of terms is not in itself enough; interoperability requires an “ontological” approach, in which not only are terms properly defined, but their hierarchical and other relationships⁵ are also properly and consistently defined.

An additional advantage of taking a disciplined ontological approach is that *new* terms can be added to the dictionary without in any way “upsetting” the meaning of existing terms. All terms have a logical place within the ontology, whether this place has been defined or not. A good ontology does not enforce a narrow view to the exclusion of others: it allows different views to co-exist in orderly relationships. This makes the ontological approach potentially more time-consuming and complex in the first instance (adding a new term may require the addition of a number of additional “structural” terms to the ontology to link the new terms with the whole), but hugely simplifying in the long run.

This takes us to what we would regard as another key issue – extensibility. There are two absolutely key issues here:

- Business models for electronic resources are continuously evolving and expanding; no mechanism for describing licence terms can be static
- Similarly, library resources should no longer be assumed to be limited to text and graphics – any approach to licence terms needs to be extensible to other media types

This second point is recognised in ERMI’s definition of its “top level” resource, an Electronic Resource, which it describes as: *“Material encoded for manipulation by computer, including texts, sounds, images, numeric data, computer programs, etc. alone or in combination, as well as materials that require the use of peripheral devices directly connected to a computer (e.g. CD-ROM drive or player) or that require a connection to a computer network (e.g. the Internet).”*

⁴ In our view, it is simply not good enough to say “Everyone knows what X means” since it is true that an individual may have a very good understanding of the semantic value of a particular term used in a particular context, but there is absolutely no certainty that someone else will have the same understanding of the term.

⁵ An ontology combines a data dictionary with a logical data model, providing a consistent and logical world view. It differs from the traditional taxonomic approach to knowledge representation in that it does not follow a rigid parent/child hierarchical structure (terms may inherit meaning from more than one “parent”) and a more complex model of relationship is maintained.

3 Distilling the EDItEUR requirements

In brief, we would suggest that, for any “licence term” extension to ONIX, EDItEUR should seek to meet the following high level requirements.⁶

It should:

- Take into account the requirements of all stakeholders in the supply chain: libraries, publishers and other rights holders, intermediaries, library users
 - In other words, capable of supporting all licence-term-related communications in the supply chain in an XML message within the “family” of ONIX messages
- Provide for the full complexity of rights expression:
 - Rights ownership statements
 - Rights offers
 - Rights agreements including licences
- Be designed to support interoperability
 - This would include the potential for ONIX expressions to be re-expressed in a declarative REL like XrML or ODRL – and in other forms of rights expression like Creative Commons.
- Be fully extensible in future, to support new business models and all media types

4 A technical analysis

Having analysed the ERMI work on rights description, we believe that the current ERMI specification and Data Dictionary could be a viable starting point for EDItEUR in creating rights terminology extensions to ONIX. We also believe that the existing ERMI terminology does not, as far as it goes, need substantial re-appraisal. It is, however, a dictionary in search of a structure, and it will require substantial extension to meet EDItEUR’s requirements.

⁶ Note that this would not be an “REL” as we have defined it in Section 2. We believe that such an extension to ONIX would probably fall outside the scope of the ContentGuard patent claims, since it would not be being used to control DRM technology. However, EDItEUR cannot securely rely on this opinion; if it is seen as a significant risk, appropriate professional advice should be sought.

4.1 What is the ERM specification?

The ERM specification is, by its nature, something of a compromise. It is partly a model specification for a system, and partly a "standard": but it not quite either: it is more like a detailed reference model. It is unlikely that any one organization would implement the specification as written, nor is it an implementable standard or set of standards such as ONIX. This is not a criticism *per se*: it is simply that these objectives are not readily compatible.

This means that of itself ERM provides a wealth of valuable material, but it does not necessarily organize this material in the most effective way in terms of flexibility and extensibility.

We also perceive some mismatch between the breadth of its declared scope (which includes rights expressions for all media types to any level of granularity) and the more limited specific terms which have been adopted, which are focussed on academic journals. A more general framework (which is present when dealing with parties and resources) is lacking when expressing rights.

We believe that two further developments would hugely enhance the ERM capability, and might lead to some re-appraisal of the ERM System Specification (Appendix 5) and certain elements of the ERD (Appendix 3), which we believe are probably not adequate to support the scope of multimedia rights expressions as described in the above requirement summary.⁷

The two key steps that we would recommend in this approach are:

- the instantiation and expansion of the Dictionary within a structured ontology; and
- the development and adoption of a comprehensive underlying Rights model

These ideas are expanded below, with reference to three examples from the existing ERM specification *for the purpose of illustration*.

4.2 Illustration 1

Existing ERM terms are defined at a detailed level, but many of the "building blocks" or "framework" terms on which these are implicitly based (terms of all sorts like *right*, *use*, *electronic link*, *cached copy*, *related version*) are not themselves scoped or defined.

There is no method for demonstrating the relationship of terms and their subtypes or allowed values, both of which are common requirements for systems and standard design. This is not to say there is not an inherent structure in the design of the Dictionary – there is – but it is neither explicit nor rich enough to

⁷ Although it is not entirely clear to us who might undertake this re-appraisal, since the DLF do not seem to have any appetite to return to work that they have published.

support the extension and mapping necessary to meet the EDItEUR requirements of interoperability and flexibility.

Here is an illustration taken from that part of the ERM specification which deals with "terms" of licences. The following table summarises the number of different licensing "terms" in this part of the ERM system model:

High level Entity	Description	No of terms
Terms Defined Entity		
Terms of Use Group	<i>Terms of use information from the described agreement</i>	28
Restrictions Group	<i>Restrictions information from the described agreement</i>	5
Perpetual Rights Group	<i>Perpetual rights information from the described agreement</i>	6
Obligations Group	<i>General obligations described in the license or business agreement</i>	24
Notes Group	<i>Additional information about the Electronic Product defined by this set of terms</i>	2
Prevailing Terms Entity		
Amount Group	<i>Quoted cost information about the Electronic Product defined by this set of terms</i>	2
Terms of Use Group	<i>Terms of use information from the described agreement</i>	28
Restrictions Group	<i>Restrictions information from the described agreement</i>	5
Perpetual Rights Group	<i>Perpetual rights information from the described agreement</i>	6
Obligations Group	<i>General obligations described in the license or business agreement</i>	26
Notes Group	<i>Additional information about the Electronic Product defined by this set of terms</i>	2

This is a total of 132 different elements from these two sections of the ERM dictionary, many of them complex. These terms are organized only according to some useful (but nonetheless arbitrary) groupings within the system specification.

For example, almost all the terms defined are duplicated (with local name changes) between the two entities ("Terms Defined" and "Prevailing Terms"): no fewer than 65 terms are duplicated for explicit use by systems builders, because there is no ontological means for relating them to the two overriding concepts ("Terms Defined" and "Prevailing Terms").

The ERM specification as published could certainly provide an appropriate solution for a specific implementation, but it is in this sense at least inappropriate to support a generic (Standards) model.

4.3 Illustration 2

Below are listed, for illustration, the 28 elements in the "Terms of Use" group (a sub section of the table above):

Fair Use Clause Indicator
All Rights Reserved Indicator
Database Protection Override Clause Indicator
Citation Requirement Detail
Digitally Copy
Digitally Copy Term Note
Print Copy

Print Copy Term Note
Scholarly Sharing
Scholarly Sharing Term Note
Distance Education
Distance Education Term Note
Interlibrary Loan Print Or Fax
Interlibrary Loan Secure Electronic Transmission
Interlibrary Loan Electronic
Interlibrary Loan Record Keeping Required Indicator
Interlibrary Loan Term Note
Course Reserve Print
Course Reserve Electronic / Cached Copy
Course Reserve Term Note
Electronic Link
Electronic Link Term Note
Course Pack Print
Course Pack Electronic
Course Pack Term Note
Remote Access
Walk-In User Term Note
Local Use Permission Term Fields

Note that there are nine elements here called "...Term Note", each of which relates to a different "Right". Neither "Term Note" nor "Right" are explicitly defined on their own in ERMI: there are therefore nine distinct "Term Note" data elements relating to nine "Rights" or Use Types. Not all existing Rights have a Term Note; some Term Notes apply to groups of Rights (eg the Inter Library Loan Term Note), others apply to no explicit Right (eg Walk-In User Term Note), although there would appear to be no reason why each Right might not have an annotation.

This approach, as with the previous example, may be a good approach to building a specific system, but it is a cumbersome and inflexible way of presenting a generic schema. A structured ontology, and a Standard message specification like ONIX, would express this in a simpler and more flexible way with two elements along these lines:

RightType (with a set of allowed values which may be added to as required)
TermNote (an optional attribute of any RightType).

If in our example a Term Note is to be applied (for example) to a group of Rights (as with Interlibrary Loan) then the attribute can be attached to the group at a different point in the schema from the individual Right. This approach of distinguishing clearly between the "global" meaning of a term, and its local application and specialization, can be well managed in a structured ontology; that it is not in the ERMI specification should not be seen as a criticism of ERMI *except in the context of our assessment of its suitability to form the basis for an ONIX extension.*

Even more critical in this context is the question of the lack of an underlying "policy model" for rights. The ERMI ERD identifies well the fundamental generic entities of parties (Organizations) and resources and their many-to-many relationships; but it fails to do anything comparable with the conditions surrounding rights management, instead assembling ad hoc groups of "terms" and "rights", many of them expressible as text notes or yes/no flags. As we have illustrated above, these elements, though normally well enough defined in

isolation, have no general or explicit “rights” or policies model to which they conform.

The problems of adopting such a “hard-coded” approach are very significant in terms of future flexibility.

4.4 Illustration 3

Consider the example of one “obligation” (the “Interlibrary Loan Record Keeping Indicator”), which is defined as “*The requirement to keep records of interlibrary loan activity and provide reports to the licensor at periodic intervals or upon request*”.

Will this express the potential variety of terms that may apply to such an activity? Note these issues:

- (1) This obligation actually contains two separate required acts: (1) to *keep records*, and (2) to *provide reports*. It is likely that some agreements will require (1) but not (2) (i.e. records available for inspection): such an option is not provided for.
- (2) To whom are the reports to be made? This element says the licensor: what if reports are to be made to someone else, for example the licensor’s agent, or a collecting society?
- (3) How frequently are reports to be made?
- (4) Is this action mandatory or on request?
- (5) Are there any parameters on the type of loan or library for whom records or reports are required?

This example is a relatively minor but typical one that illustrates a fundamental reality: policy management is about *the description of complex events* with many variables. The questions *what ? by whom? to whom? when? where? how?* may be critical in describing *any* event that is proposed, permitted, prohibited or required in a licence. An arbitrary “hard-coded” condition – such as that illustrated above – is inadequate for this task. Not all questions have to be answered for all events, of course, but the underlying model must support the capability that such questions can be asked and answered when required.

The difficulty here is not that terms are undefined; it is that there may be many valid alternative or specialized meanings of such key terms, for use with different types of materials and uses under different jurisdictions. A “one size fits all” approach is inadequate to support the requirements that we have defined above on EDItEUR’s behalf.

We also note that certain important areas of policy metadata – such as maintaining Rights Statements of ownership and control of resources and sets of resources – are not covered in ERMI, and these will be required.

We also note one further issue: the lack of any mechanism for definitions of resource types and other things which may play definitive roles in rights statements.

ERMI specifies that resource types are to be “restricted to a canonical list of types (site-defined)”; this precisely highlights the problem: “a canonical list” cannot be defined by a “local site” if it is to be understood by and interoperable with third party communication. Organisations must be free to define resources in many different ways, but for them to communicate unambiguously with a third party what they mean by “book” or “e-book” or “atlas”, *not least if it is a term in a licence agreement*, requires an ontology where such terms and their different specialized meanings may be related with as little ambiguity as possible.

The current ERMI Dictionary cannot support that. A way is needed for organizing *types* of things where organizations wish to collaborate to create a standard vocabulary to support; this especially includes rights and the attributes of rights expressions.

5 Conclusions and recommendations

Assuming that EDItEUR decides that there is a real requirement to build (as an extension to the existing ONIX family of messages) a mechanism for communicating within the “electronic publishing supply chain” complex messages relating to licence terms (but not a declarative REL), we believe that ERMI will provide a valuable initial resource. However, at the same time, we do not believe that a set of “ONIX for licences” messages based directly on the ERMI dictionary would meet the requirements that we have defined in Section 3.

In order to meet these requirements, we would recommend the development of a generic ontological structure for rights based on a “contextual”, event-based architecture such as that which underlies the MPEG-21 RDD (an example of such a model is illustrated in *Figure 1* below). This approach will accommodate “flatter”, simpler statements where they are sufficient or are the only available data. Such a model will support “ONIX for licences” messages for all media types.

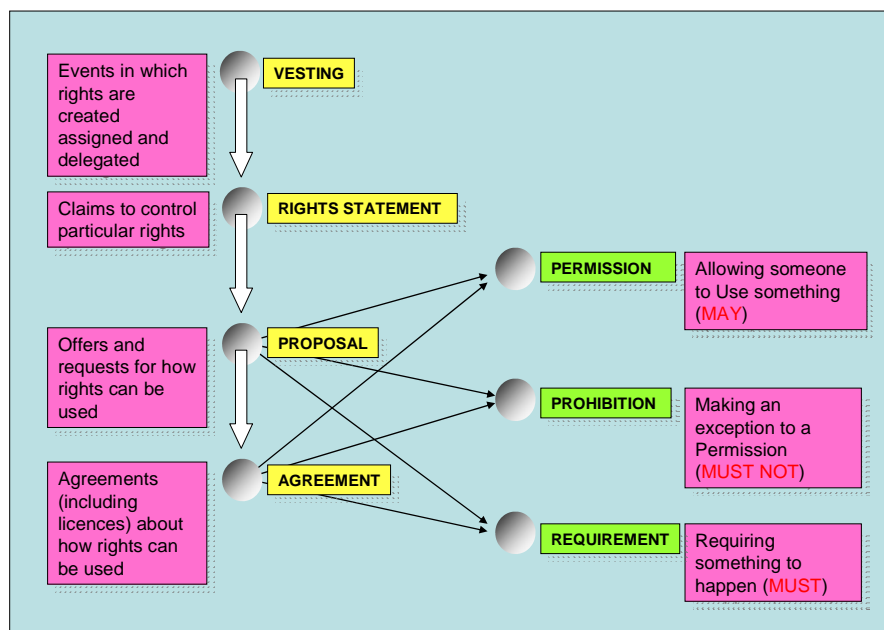


Figure 1 The Ontologyx Generic Rights Model

To summarize, an ontological structure and generic rights model would meet several objectives for EDItEUR and the community it serves:

1. enable the underlying data dictionary to be more clearly presented and **navigated** than is currently possible with the ERMI dictionary.
2. provide more **flexibility** in the development of ONIX communication standards (and systems to support them).
3. provide a basis for the richest expression of all types of policies
4. make the dictionary (and therefore communication standards and systems built on it) much more easily **extensible**, with new terms easily added when needed within an explicit structure.
5. provide a better basis for **mapping** to other schemas such as MARC or SCORM, and to RELs such as ODRL or XRML.

Such an approach would not in some way isolate the ERMI community; indeed, if the ERMI terms were to be used as primary input to the development of such an ontology, it would provide an integration between ERMI and ONIX terms which would allow both to be readily accessible to using ERMI-based systems. It is possible that such a development might also lead to some re-appraisal of the ERMI specification itself. This consideration, however, is beyond the scope of this short paper.