A URN Standard for Legal Document Ontology: a Best Practice in the Italian Senate

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Abstract. Uniform Resource Names (URNs) are conceived by the Internet community for providing unambiguous and lasting identifiers of network resources, independently from their physical locations, availability and actual publication. In this paper a proposal of a URN schema for indentifying sources of law at international level is presented. Moreover an implementation of such schema at the Italian Senate is shown.

1. Introduction

Uniform Resource Names (URNs) are conceived by the Internet community for providing unambiguous and lasting identifiers of network resources, independently from their physical locations, availability and actual publication. In particular they play a key role in the legal domain where references to other legislative measures are very frequent and extremely important: the possibility of being able to immediately providing effective references and accessing legal documents is a desirable feature able to promote transparency and "certainty of law". Moreover the growing necessity of improved quality and accessibility of legal information amplifies the need for interoperability among legal information systems in national and international setting. A persistent, shared, open standard identifier for legal documents at international level is an essential prerequisite for establish such interoperability. Besides legal content providers, Internet content creators including publishers operating well outside the traditional arenas of legal publishing (news, technical documentation providers, etc.) can benefit by this standard because it facilitates the linking of legal documents and reduces the cost of maintaining documents that contain such references. This will result in a benefit for users as well, since they will enjoy a more richness and reliability of cross-referencing facilities, not only limited within the same information system as it is usually today. In the last few years a number of initiatives both in and outside Europe have arisen in the field of legal document standards to improve legal document accessibility on the Internet (Francesconi 2007). In this paper we describe a standard for the identification of sources of law,

recently submitted to the IETF as Internet Draft[1]: it is based on a URN technique capable of scaling beyond national boundaries as well as on the definition of a namespace convention (LEX) and a structure that will create and manage identifiers for sources of law at international level. The identifiers will be globally unique, transparent, persistent, location-independent, and language-neutral. These qualities will facilitate legal document management, moreover they will provide a mechanism of stable cross-collections and cross-country references. In this direction also the Permanent Bureau of the Hague Conference on Private International Law has recently expressed its opinion, encouraging EU Member States to adopt neutral methods of citation of their legal materials, including methods that are medium-neutral, provider-neutral and internationally consistent. This paper is organized as follows: in Section 2 the general structure of the URN-LEX identifier is introduced; in Section 3 the bibliographic FRBR reference model which the URN-LEX schema is based on is described; in Section 4, 5, 6 and 7 the main components of the schema able to identify legal documents at different levels of abstraction are shown; in Section 8 the modalities to establish references to a whole document or part of it using the URN-LEX methodology is briefly discussed; in Section 9 the principles of the resolution service are described; in Sections 10 and 11 the URN-LEX schema and a tool for automatic legal references mark-up according to such standard as implemented within the Italian Senate Web site are respectively described. Finally in Section 12 some conclusions are reported.

2. Structure of the identifier

As usual, the problem is to provide the right amount guidance at the core of the standard while providing sufficient flexibility to cover a wide variety of needs. The proposed URN- LEX identifier standard does this by splitting the identifier into a hierarchy of components. Its main structure is:

```
"urn:lex:"<NSS>
```

where "urn:lex" is the Namespace, which represents the domain in which the name has validity, as well as NSS is the Namespace Specific String composed as follows:

```
<NSS>::=<country>":"<local-name>
```

where: <country> is the part providing the identification of the country, or the multi-national or international organisation, issuing the source of law;

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[1] http://datatracker.ietf.org/doc/draft-spinosa-urn-lex/

`<local-name>` is the uniform name of the source of law itself. It is able to represent all the aspects of an intellectual production, as it is a legal document, from its initial idea, through its evolution during the time, to its realisation by different means (paper, digital, etc.).

The `<country>` element is composed of two specific fields:

```
<country>::=<country-code>[";"<country-unit>]*
```

where: `<country-code>` is the identification code of the country where the source of law is issued. This code follows the standard [ISO 3166] Alpha-2 (it=Italy, fr=France, dk=Denmark, etc.). In case of multi-national (e.g., European Union) or international (e.g., United Nations) organizations the Top Level Domain Name (e.g., "eu") or the Domain Name (e.g., un.org, wto.int) is used instead of ISO 3166 code; `<country-unit>` are the possible administrative hierarchical sub-structures defined by each country, or organization, according to its own structure. This additional information can be used where two or more levels of legislative or judicial production exist (e.g., federal, state and municipality level) and the same bodies may be present in each jurisdiction. Then acts of the same type issued by similar authorities in different areas differ for the country-unit specification.

3. Reference Model for the `<local-name>` structure

The `<local-name>` will encode all the aspects of an intellectual production, from its initial idea, through its evolution during the time, to its realisation by different means (paper, digital, etc.). For these purposes it is based on the FRBR[2] model developed by IFLA[3]. Following the FRBR model, in a source of law, as in any intellectual production, 4 fundamental entities (or aspects) can be specified.

The first 2 entities reflect its contents: Work: identifies a distinct intellectual creation; in our case, it identifies a source of law both in its being (as it has been issued) and in its becoming (as it is modified over time); Expression: identifies a specific intellectual realisation of a work; in our case it identifies every different (original or up-to-date) version of the act over time and/or language in which the text is expressed;

while the other 2 entities relate to its form:

Manifestation: identifies a concrete realisation of an expression; in our case it identifies realizations in different media (printing, digital, etc.), encoding formats (XML, PDF, etc.), or other publishing characteristics; Item:

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[2] Functional Requirements for Bibliographic Record
[3] International Federation of Library Associations and Institutions

identifies a specific copy of a manifestation; in our case it identifies individual physical copies as they are found in particular physical locations.

4. Structure of the `<local-name>`

The `<local-name>` component of the urn:lex identifier contains all the necessary pieces of information enabling the unequivocal identification of a legal document, within a specific legal system. In the urn:lex specification, a legal resource at "work" level is identified by four elements: the enacting authority; the type of measure; details (or terms) (like date of issue, number of the act, etc.) possibly, any annex.

It is often necessary to differentiate various expressions, that is: the original version and all the amended versions of the same document; the versions of the text expressed in the different official languages of the state or organization.

Finally the uniform name allows a distinction among diverse manifestations, which may be produced in multiple locations using different means and formats. In every case, the basic identifier of the source of law (work) remains the same, but information is added regarding the specific version under consideration (expression); similarly a suffix is added to the expression for representing the characteristics of the publication (manifestation). All this set of information is expressed in the jurisdiction official language; in case of more official languages, more names (aliases) are created for each language.

Therefore, the more general structure of the national name appears as follows:

```
<local-name>::=<work>[''@''<expression>]?["$"<manifestation>]?
```

However, consistent with legislative practice, the uniform name of the original provision becomes the identifier of an entire class of documents which includes: the original document, the annexes, and all its versions, languages and formats subsequently generated.

5. Structure of the Identifier at Work Level

The structure of the document identifier at work level is made of the four fundamental elements mentioned above, chosen from those used in citations, clearly distinguished one from the other in accordance with an order identifying increasingly narrow domains and competences. The use of citation elements at work level allows to construct the URN of the cited act manually or by software tools implementing automatic hyperlinking of legal sources on the basis of the textual citations of the acts. The general structure of the identifier at work level is:

```
<work>::=<authority>":"<measure>":"<details>[":"<annex>]*
```

where:
`<authority>` is the issuing authority of the measure (e.g., State, Ministry, Municipality, Court, etc.);
`<measure>` is the type of the measure (e.g., act, decree, decision, etc.);
`<details>` are the terms associated to the measure, typically the date and the number;
`<annex>` is the identifier of the annex, if any (e.g., Annex 1).

In case of annexes, both the main document and its annexes have their own uniform name so that they can individually be referenced; the identifier of the annex adds a suffix to that of the main document. In similar way the identifier of an annex of an annex adds an ending to that of the annex which it is attached to. The main elements of the national name are generally divided into several elementary components, and, for each, specific rules of representation are established (criteria, modalities, syntax and order)[4]. Examples of `<work>` identifiers are:

```
urn:lex:it:stato:legge:2006-05-14;22
urn:lex:uk:ministry.justice:decree:1999-10-07;45
urn:lex:ch;glarus:regiere:erlass:2007-10-15;963
urn:lex:es:tribunal.supremo:decision:2001-09-28;68
```

In the states or organisations that have more than one official language, a document has more identifiers, each of them expressed in a different official language, basically a set of equivalent aliases. This system permits manual or automated construction of the uniform name of the referred source of law in the same language used in the document itself (e.g., `urn:lex:eu:council:` `directive:2004-12-07;31`, `urn:lex:eu:consiglio:direttiva:2004-` `12-07;31`, etc.). Moreover, a document can be assigned more than one uniform name in order to facilitate its linking to other documents. This option can be used for documents that, although unique, are commonly referenced from different perspectives. For example, the form of a document's promulgation and its specific content (e.g., a Regulation promulgated through a Decree of the President of the Republic).

6. Structure of the Identifier at Expression Level

There may be several expressions of a legal text, connected to specific versions or languages. Each version is characterized by the period of time during which that text is to be considered as the valid text (in force or effective). The lifetime of a version ends with the issuing of the subsequent version. New

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[4] For the details regarding each element, see Attachment B of the IETF Internet Draft http://datatracker.ietf.org/doc/draft-spinosa-urn-lex/

versions of a text may be brought into existence by: changes as regards text or time (amendments) due to the issuing of other legal acts and to the subsequent production of updated or consolidated texts; correction of publication errors (rectification or errata corrige); entry into or departure from a particular time span, depending on the specific date in which different partitions of a text come into force. Each such version may be expressed in more than one language, with each language-version having its own specific identifier. The identifier of a source of law expression adds such information to the work identifier, using the following main structure:

```
<expression>::="@"<version>[":"<language>]?
```

where:

`<version>` is the identifier of the version of the (original or amended) source of law. In general it is expressed by the promulgation date of the amending act; anyway other specific information can be used for particular cases. If necessary, the original version is specified by the string "original";

`<language>` is the identification code of the language in which the document is expressed, according to ISO 639-1 [7] (it=Italian, fr=French, de=German, etc.); in case the code of a language is not included in this standard, the ISO 639-2 (3 letters) is used. This information is not necessary when the text is expressed in the unique official language of the country.

Examples of document identifiers for expressions are:

`urn:lex:ch:etat:lois:2006-05-14;22@originel:fr` (original version in French)

`urn:lex:ch:staat:gesetz:2006-05-14;22@original:de` (original version in German)

`urn:lex:ch:etat:lois:2006-05-14;22@2008-03-12:fr` (amended version in French)

`urn:lex:ch:staat:gesetz:2006-05-14;22@2008-03-12:de` (amended version in German)

7.   Structure of the Identifier at Manifestation Level

To identify a specific manifestation, the uniform name of the expression is followed by a suitable suffix describing the: digital format (e.g., XML, HTML, PDF, etc.) expressed according to the MIME Content-Type standard [RFC 2045], where the "/" character is to be substituted by the "-" sign; publisher or editorial staff who produced it; possible components of the expressions contained in the manifestation. Such components are expressed by "body" (the default value), representing the whole or the main part of the document, or by the caption of the component itself (e.g. Table 1, Figure 2, etc.); other features of the document (e.g., anonymized decision text).

The `<manifestation>` suffix will thus read:

```
<manifestation>::=<format>":"<editor>[":"<component>]?[":"<feature>]?
```

To indicate possible features or peculiarities, each principal element of the manifestation may be followed by a further specification. For example, the original version the Italian act 3 April 2000, n. 56 might have the following manifestations with their relative uniform names:

PDF format (vers. 1.7) of the whole act edited by the Parliament:

```
urn:lex:it:stato:legge:2000-04-03;56$application-pdf;1.7:parliament
```

Furthermore, it is useful to be able to assign a uniform name to a component of a manifestation in case non-textual objects are involved. These may be multimedia objects that are non-textual in their own right (e.g. geographic maps, photographs, etc.), mixed with textual parts. In these ways, a "lex" name permits: exploitation of all the advantages of an unequivocal identifier that is independent of physical location; a means to provide choice among different existing manifestations (e.g. XML or PDF formats, resolution degree of an image etc.) of the same expression.

8. Sources of Law References

References to sources of law often refer to specific partitions of the act (article, paragraph, etc.) and not to the entire document. Therefore, for allowing applications to manage this information(e.g., pointing a specific partition on the browser), it is necessary that a partition identifier within the act is present (i.e. an unequivocal label or ID). For enabling the construction of the partition identifier between different collections of documents, specific construction rules for IDs or labels SHOULD be defined and shared, within each country or jurisdiction, for any document type (e.g., for legislation, the paragraph 2 of the article 3 might have as label or ID the value "art3-par2").

Furthermore, it is useful to foresee the compatibility with applications able to manage this information (e.g., returning the proper element); these procedures are particularly useful in the case of rather long acts, such as codes, constitutions, regulations, etc.

For this purpose it is necessary that the partition identifier is transmitted to the servers (resolution and application) and therefore it cannot be separated by the typical "#" character of URI fragment, which is not transmitted to the server.

According to these requirements, the syntax of a reference is:

```
<URN-reference>::=<URN-document>["~"<partition-id>]?
```

(e.g., to refer to the paragraph 3 of the article 15 of the French Act of 15 may 2004, n. 106, the reference is written

```
urn:lex:fr:etat:loi:2004-05-15;106~art15-par3).
```

Using a different separator ("~") from the document name, the partition ID is not withheld by the browser but it is transmitted to the resolution process. This enables the resolver to retrieve (for example, out of a database), if it is possible, only the referred partition, otherwise to return the whole act. Anyway, to make it effective pointing to the indicated partition, the resolver SHOULD transform the partition ID of each returned URL in a URI fragment; this is obtained appending to URL the "#" character followed by the partition ID (in the example above, the returned URL will be `<URL-document>#art15-par3`).

Anyway it is possible to use the general syntax (with "#"); in this case only the URN document component of the reference is transmitted to the resolver, therefore the whole document will be always retrieved.

9. The Resolution Service

The task of the resolution service is that of associating a LEX identifier with a specific document address on the network. The system has a distributed architecture based on two fundamental components: a chain of information in DNS (Domain Name System) and a series of resolution services from URNs to URLs, each competent within a specific domain of the namespace. Through the NAPTR records of the DNS (described in [RFC 3403]), the client identifies the characteristics (protocol, port, site) of the service capable of associating the relative URLs with the URN in question, thereby allowing access to the document. A resolution service can delegate the resolution and management of hierarchically-dependent portions of the name. Delegation of this responsibility will not be unreasonably withheld provided that the processes for their resolution and management are robust and are followed. For the "lex" namespace, the declared registrant of the namespace (ITTIG-CNR) will maintain the root zone "lex.urn.arpa" and, in correspondence with the adhesion of a new country (e.g., "br"), will update the DNS information with a new record to delegate the relative resolution. This may be obtained by a regular expression that matches the initial part of the URN (e.g., "urn:lex:br") and redirects towards the proper zone (e.g., "lex.senado.gov.br"). Likewise the institution responsible for the country uniform names (e.g., "urn:lex:br") has the task of managing the relative root in the DNS system (e.g., "lex.senado.gov.br" zone) and routing the resolution towards its resolvers on the basis of parts of the uniform names. In similar way it can delegate the resolution of country sub-levels (e.g., "urn:lex:br;sao.paolo") towards the relative zone (e.g., "lex.sao-paolo.gov.br"). At the end of the delegation chain routing, the address of the resolution service is provided and this service gives back the network addresses (URLs) of the items. The resolution service is based on two main elements: a knowledge base (consist-

ing in a catalogue or a set of transformation rules) and a software to query the knowledge base itself.

9.1. CATALOGUES FOR RESOLUTION

The architecture of the catalogue of resolution has to take into account that incompleteness and inaccuracy are rather frequent in legal citations, and incomplete or inaccurate uniform names of the referred document are thus likely to be built from textual references (this is even more frequent if they are created automatically through a specific parser). By contrast with systems that can be constructed around rigorous and enforceable engineering premises, such as DNS, the LEX resolver will be expected to cope with a wide variety of "dirty" inputs, particularly those created by the automated extraction of references from incomplete or inaccurate texts. In this document, the result is a particular emphasis on a flexible and robust resolver design. For these reasons, the implementation of a catalogue, based on a relational-database, is suggested, as it will lead to a more higher flexibility in the resolution process as partial match. In addition the catalogue must manage the aliases, the various versions and languages of the same source of law as well as the related manifestations. It is suggested that each enacting authority implements its own catalogue, assigning a corresponding unambiguous uniform name to each resource.

9.2. SUGGESTED RESOLVER BEHAVIOUR

First of all the resolution process should implement a normalization of the uniform name to be resolved. This may involve transforming some components to the canonical form (e.g., filling out the acronyms, expanding the abbreviations, unifying the institution names, standardizing the type of measures, etc.). For this function the registers of names and authorities organization, including validity time span, as well as the registers of the types of measure are useful. The resolver should then query the catalogue searching for the URN which corresponds exactly to the given one (normalized if necessary). Since the names coming from the references may be inaccurate or incomplete, an iterative, heuristic approach (based on partial matches) is suggested. It is worth remarking that incomplete references (not including all the elements to create the canonical uniform name) are normal and natural; for a human reader, the reference would be "completed" by contextual understanding given by the including document. Lacking more specific indications, the resolver should select the best (most recent) version of the requested source of law, and provide all the manifestations with their related items. A more specific indication in the uniform name to be resolved will, of course, result in a more selective retrieval, based on any suggested expression and/or manifestations components (e.g. date, language, format, etc.).

10. URN standard within the Italian Senate

URN:LEX standard has stemmed from the experience of the Italian legislative XML project NormeInRete (NIR). The feasibility study of such a project was launched in 1999, while the real implementation of the system started in 2001. A URN naming convention for legal resources was in particular defined, in terms of a URN:NIR namespace, whose structure shares, with the URN:LEX standard, principles, characteristics and identification components, therefore it can be considered an ante-litteram implementation of the URN:LEX naming convention. Due to these relationships a change from the NIR to the LEX more general namespace is straightforward and can be automatically implemented. Currently within the Italian Senate of the Republic Web site, a URN:NIR standard is implemented to identify the following type of documents: Assembly reports, Assembly agenda, Committee reports and minutes, Bills, Bill relations, Bill preambles, "Iter Legis" cards, Questions and answers reports. A transparent identifier for the previously mentioned types of documents are constructed, starting from the formal parameters of the acts. Here below are some examples:

Assembly report n. 365 of the XVI Legislature

```
urn:nir:senato.repubblica;assemblea:resoconto:16.legislatura;365
```

Assembly agenda of 15 April 2010

```
urn:nir:senato.repubblica;assemblea:ordine.giorno:2010-04-15
```

Committee report n. 259 of the XVI Legislature

```
urn:nir:senato.repubblica;commissioni:bollettino:16.legislatura;259
```

Bill n.1880 of the XVI Legislature

```
urn:nir:senato.repubblica:disegno.legge:16.legislatura;1880
```

Relation (template A) to the Bill n. 1880 of the XVI Legislature

```
urn:nir:senato.repubblica:disegno.legge;relazione:16.legislatura;1880-a
```

Approved preamble to the Bill n. 1880 of the XVI Legislature

```
urn:nir:senato.repubblica:disegno.legge;approvato:16.legislatura;1880
```

Iter Legis card between chambers, n. 1880 of the XVI Legislature

```
urn:senato-it:parl:ddl:senato;16.legislatura;1880
```

11. A tool for automatic legal references mark-up within the Italian Senate Web site

A legal text may contain lots of references to other documents which are described using the related URN, so that references can be transformed in effective links when documents are published on the Web. Information for URN construction is usually contained in citations (for example the citation: "Act 24 November 1999, No. 468" generates the following URN-NIR `urn:`

`nir:stato:legge:1999-11-24;468`). The manual construction of hyper-links in terms of URN for each reference can be a time-consuming work. For this reason a module able to automatically parse legal documents, detecting cross-references and assigning them the related URNs has been developed. Such module, called xmLegesLinker, developed by ITTIG-CNR under the GNU-GPL license, is generated using LEX and YACC technologies (Johnson, 1975; Lesk, 1975), on the basis of the vocabulary of the citations and the URN grammar expressed in EBNF syntax.

Figure 1. LEX technologies

Using LEX technologies a lexical analyzer is generated (yylex) able to detect tokens, namely symbols (words, numbers and punctuation marks) belonging to the citation vocabulary (Figure 1). Then using YACC technologies, a syntactical analyzer is generated (yyparse) able to recognize a sequence of tokens, generated by LEX, as representing a reference, and to construct the related URN (Figure 2).
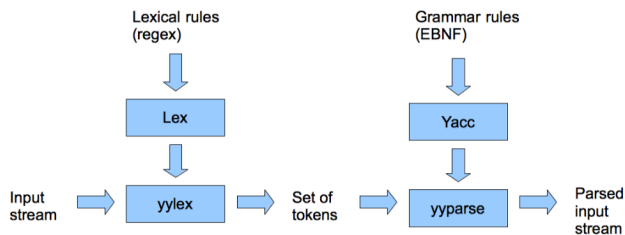

Figure 2. Combination of LEX and YACC technologies

Such tool is integrated within xmLegesEditor[5] a legislative XML editor developed by ITTIG-CNR for the NIR project, and it is used by several projects using NIR standards. In particular xmLegesLinker has been integrated within the Italian Senate Web site: once a document is queried through the Senate search engine, retrieved and displayed in the browser, the user may decide to automatically detect all the legal references in the text, as well as construct and display them, ready to query the Senate resolution system. For instance, given a citation to "Article 14 of Act 23 August 1988, No. 400", such reference is automatically detected and described according to the related URN: `urn:nir:stato:legge:1988-08-23;400~art14`

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[5] http://www.xmleges.org

Moreover, such a URN is made effective by constructing a query to the Senate resolution system: `http://www.senato.it/uri-res/N2Ls?urn:nir:stato:legge:1988-08-23;400~art14` The resolution system will translate the URN into an automatic query addressed to a professional and commercial legislative database, in case the user is directly connected to the Senate intranet structure; otherwise, in case of internet users, the query will be automatically addressed to the public legislative database. Figure 3 shows a document retrieved within the Senate Web site, before and after the activation of the automatic references mark-up service (xmLegesLinker). The Senate resolution system makes it also possible to translate URN references to official internal publications, such as, to give an example: `http://www.senato.it/uri-res/N2Ls?urn:nir:senato.repubblica;assemblea:resoconto:16.legislatura;365`
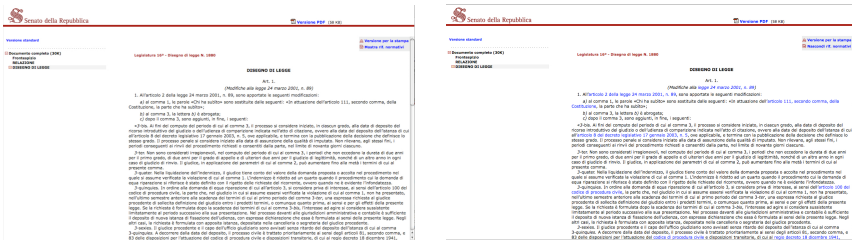

Figure 3. Document before and after legal references mark-up

As far as internal users are concerned (Intranet users), the Senate made it available two further functions for the parsing of legal references:

1. Parsing of personal documents in the following formats: "plain text", HTML, RTF, MS Word
2. Parsing of Internet sites.

The parsing of the users personal documents can only be made from computers within the Senate net. The following image shows the starting screenshot of the application:

In order to activate the function for the parsing of legal references, users must select a file type "plain text", HTML, RTF or MS Word from the file system.

Therefore, the application will show an HTML page consisting of two columns. The left column shows the original document in HTML format, whose legal references identified by the parser are highlighted. In case of activation of one of the links in the left column, the right column shows the result of the search, that is to say, the text of the legal resource retrieved in the professional legislative database used by the Senate.
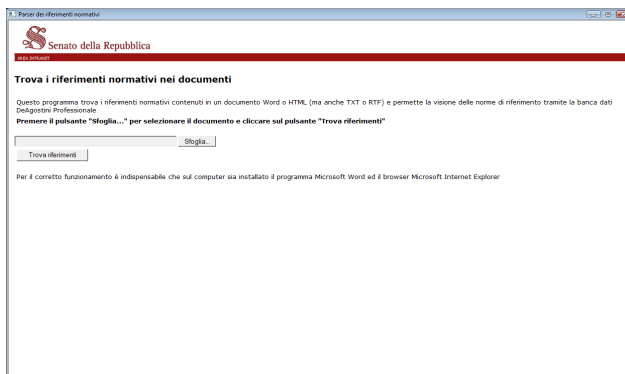
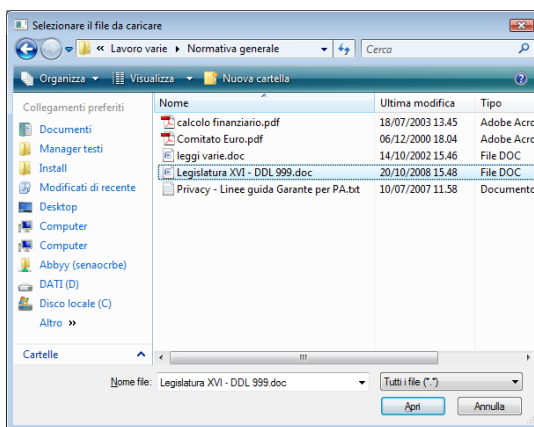*Figure 4.* Parsing of personal documents – Start page

Figure 5. Parsing of personal documents – Document choice

The application is based on the integrated use of an MS Word converter (whose presence in the user's computer is mandatory), of the parser xmLeges-Linker and of the Senate URN2DEA resolver, which automatically translates a URN:NIR identifier in a query addressed to the professional database used by the Senate. The second parsing function, available only for internal users of the Senate net, enables the scanning of legal references which may occur in any internet site. Users only need to enter a page URL into the starting page "Find Legal References".

Clicking on the "Find" button, the original webpage is captured and parsed, then the detected legal references are highlighted with a link. Basically, this service occurs between the browser and the requested site (web proxy function); for each page, such service implements the references parsing by using xmLegesLinker. Similarly in this case the activation of a link invokes the URN2DEA Senate resolver. The following images show a legal Internet site, before and after the use of the above mentioned function:
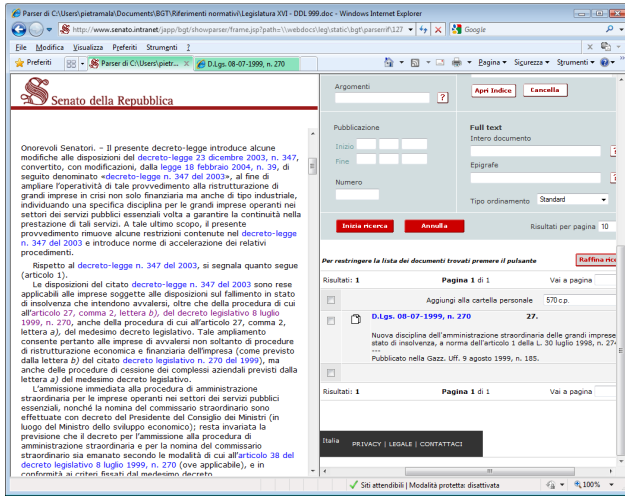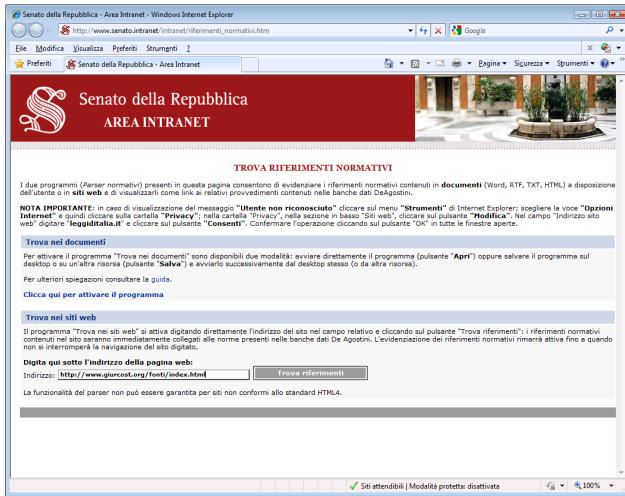
Figure 6. Parsing of personal documents – Result

Figure 7. Parsing of Internet sites – Start page

12. Conclusions and Future Perspectives

In this paper the main principles of a URN schema for legal documents (sources of law) as submitted to IETF for registration in terms of a LEX namespace is presented. The syntax of the identifier and its usage in a multilanguage context is shown, as well as the principles of a resolution service able to guarantee persistence of the links based on URN, independently from
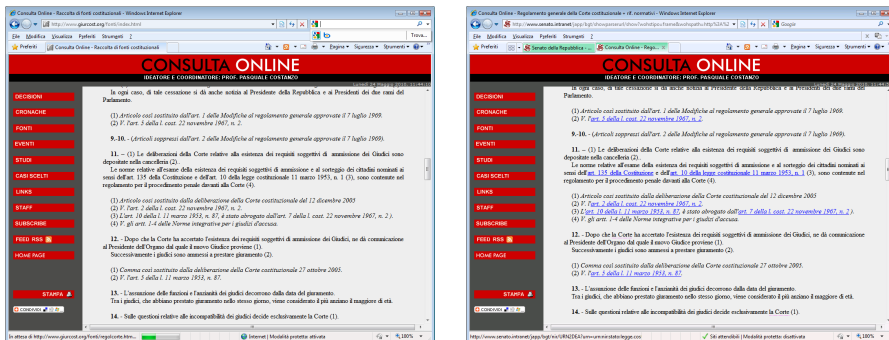
Figure 8. Parsing of Internet sites – Original and parsed web page

any change in document physical locations. The URN:LEX RFC is currently at the status of IETF Internet Draft and it is going to be revised according to the comments which are being received. Moreover an implementation of the URN:LEX standard within the Italian Senate of the Republic, as well as a tool to implement automatic legal references mark-up (automatic legal documents hyperlinking) as integrated within the Italian Senate Web site, have been shown. Shortly a plug-in for Firefox, developed by ITTIG-CNR, will be available: it allows a browser to natively exploit the URN protocol, routing the resolution service through the DNS Internet infrastructure, without the necessity to transform a URN hyperlink attribute into an http query to the resolution system.

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