

SEMANTIC RECONCILIATION BETWEEN TWO DIFFERENT ASPECTS OF LAW

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Abstract

This paper presents a proposal for reconciliation between the warehouse of legal documents created during legislation and Knowledge Warehouse that is dedicated to assisting both citizens and public officers in the procedural legal rules of Public Administration in Hungary. The Knowledge Warehouse contains several thousand detailed rules that describe how to manage and handle life events of citizens. This description can be considered as generic legal cases within legal procedures of authorities. The citizens trigger specific instances of the generic ones. The evolving Knowledge Warehouse main purpose is to enable citizens to get their specific legal cases started either through Web on the Government Portal or with the help of public officers. The Knowledge Warehouse will be extended by ontologies and semantic search capabilities. An Integrated System for Supporting of Codification will be created in an on-going project that will serve as sound basis for the National Warehouse of Legal Rules. The National Warehouse pursues the prescription of MetaLex legal standards in the case of representation of electronic legal documents. The two Warehouse are strongly coupled to each other. However, the syntactic and semantic structure of both differs profoundly. The representation of e-documents within the National Warehouse is in line with ELI, the European Legislation Identifier, even the ontologies and attached semantic description concentrates on the legal documents structural elements and their interpretation. The Knowledge Warehouse focuses on ontologies of life events and procedures of authorities to leverage semantic searching. The proposed solution tries to reconcile and integrate the two differing approaches.

1. Introduction

Within Public Administration, the *procedural knowledge* for execution and interpretation of legal rules plays key role in relationship with citizens. The goal of this research is to analyze and outline an approach for connecting the representation of the codified and officially published legal rules and the representation of procedural knowledge at both syntax and semantic level. The building blocks of the proposal are the XML schemas and ontologies that enable for carrying out schema and pattern matching.

The formalization and representation of *procedural knowledge* of activities within public administration in XML and relational schema format is the basis. The meta-data related to the codified legal rules following European Union standard [7] serves as a dynamic connector to keep up-to-date the legal rule base for public officers, and ontology that follow a metaphor of citizens' life-events assists the public officers in searching of specific cases and helping citizens. The aim of our proposal is that to formalize the concepts of *procedural knowledge* and *life-events*, to map the syntax level representation of codified legal rules in XML and XML schema onto the sections of the description of procedural knowledge that contain the references and partial, relevant texts of codified legal rules.

To realize the above outlined programme, different models are needed.

1. A concept of *generic document* for describing the procedural knowledge that can be captured through a schema description, and The XML Schema can be considered as meta-data structure of instances of generic documents [12]. This generic document structure provides the opportunity to build a bridge between the syntactical representation of *procedural knowledge* and the representation of *codified legal rules*.
2. The XML structure of generic documents provide the opportunity to connect semantic annotation to certain elements or attributes of documents, the semantic annotation makes use of the ontologies of life events and legal concepts.
3. A *domain ontology* for legal concepts involved in public administration is necessary. In the case of citizens' relationship management, the legal concepts belong to the domain ontology that is dedicated to primarily to public administration, i.e. interpretation and execution of laws related to life events of citizens.
4. A *definite part* of the *general legal core ontology* that model the abstract legal notion and organization of government and judicial system, the concepts included in this part is required to describe the processes of public administration.
5. A model of support system for semantic searching that aids public officers in seeking, locating and providing information in the framework of knowledge management.

The paper presents the XML syntax of the metadata for processes of public administration, describes the core and legal domain ontologies and finally introduces the semantic search system. The proposal is for the creating a reliable, and maintainable link between the *Knowledge Warehouse* and *Integrated Legislative System (ILS)* in Hungary.

2. Literature Review

In the past decades, the researches on electronic legal and other document-centric systems have progressed immensely. The documents that describe resources and procedures for legal activities and public administration are represented in dialects of XML [1][2][3]. The Metalex/CEN [5], is a de facto standard in EU Member States and de jure standard in EU Institutions to create legal resources in XML format including the various levels of legislations within an EU Member State. Akomo Ntoso standard was created for legal resources of parliamentary legislation processes and documents generated in judiciary processes [16], the objective of Australian Judgment XML standard was similar [15], moreover there was an OASIS initiative 0. Eunomos [4] contains a legal ontology that allows for legislation-specific and generic definition to cohabitate. The EXTRELLA project [8] makes use of Metalex/CEN standard for defining XML Schema of the Legal Resources [7], LKIF-core describe the legal concepts in OWL [10], LKIF-rules formulate the model of ruled for the legal knowledge. The *Legal Knowledge Format (LKIF)* and the *Core Ontology of Basic Legal Concepts* were European Framework projects [9] and the aim of these projects was to provide the opportunity the conversion and mutual mapping between legal knowledge-bases that were created by disparate representation methods of knowledge bases; the projects tried to specify a common knowledge representation for the legal domain that may operate as a nucleus among the diverse approaches of knowledge representation. Ontology for public Administration and Life Events was depicted as an outline proposal in Ref. [14]. OntoGov project [1] created a meta-ontology for e-Government. Some solution even made possible that the structure of precedents and of different interpretations can be marked up within the XML document.

2.1. Syntactical and semantical Reconciliation between two Branches of Legal Domains

There is a network of Government One-Stop Shops in Hungary that provides public administration services for citizens. *Knowledge Warehouse* is a service that is currently available, and contains the descriptions of issues and cases that belong to the responsibilities of public authorities to deal with them. The public officers of citizens' relationship management in One-Stop-Government-Shops use Knowledge Warehouse on a daily basis. Furthermore, the citizens, clients can access the content of Knowledge Warehouse through a Web interface, at least partially, i.e. they can retrieve documents, official forms that are required to initiate a case and a process of public administration, moreover content of general information to be known.

The changing and evolving requirements against the citizens relationship management on the side of clients made necessary the development of Knowledge Warehouse. The progress of technology and the objectives of process improvement of public administration towards a unified and uniform treatment of citizens made possible a refurbishing project for Knowledge Warehouse. The upgraded Knowledge Warehouse offers extended areas of case descriptions, as e.g. on the collection of taxes, levies, customs, excises and other obligations towards the state, furthermore municipal responsibilities, judicial and other public service functions, in addition to the existing administrative cases. Each area of cases has a legal entity who is responsible for uploading and maintaining the case descriptions. Knowledge Warehouse as a complex Information System supports the creation of new case descriptions, building up the connections to the legal resources being in force in order to keep the references up-to-date and to safeguard the compliance between the case descriptions and the actual legal resources. The Knowledge Warehouse has three user target groups: clients, service staff of citizen relationship management who works in different contact forms as personal, telephone and chat customer services, moreover colleagues who work in the back-office. Citizens can access the services and content of the Knowledge Warehouse through an online interface. The public officers of personal, telephone, chat citizen services, and in the back-office who are not directly contacted by clients / citizens may need such information that dedicated to administrative processes and not for use of citizens so that the Knowledge Warehouse should ensure the separation of content on the basis of the need-to-know.

The content of Knowledge Warehouse can be accessed through an on-line interface by citizens. The services of Knowledge Warehouse allow for linking the case descriptions and the relevant official forms, moreover the applications that support the filling-in and submitting of forms to initiate the related process of public administration can be assigned to the related case descriptions. This solution makes possible for a citizen who may search for a specific case and then finding the relevant information and official forms that he or she may continue the fulfillment of forms directly. Several years ago, there was an attempt to support both public officers and citizens in the details of particular processes within public administration through a Web interface in the form of **Knowledge Warehouse** (procedures and routines of public administration processes for managing life events of citizens). Behind the Web interface, there was a set of spread-sheets that contained the meticulous description of routines and the relevant legal sources. It is self-evident, that this solution was neither end-user-friendly nor efficient, thereby the necessary next step is to transform the structure of spreadsheets into conceptual model, i.e. an Entity-Relationship model (Figure 1.) and relational schemas then an adequate database model should be looked for, as e.g. document, graph, column-oriented database etc. solution.

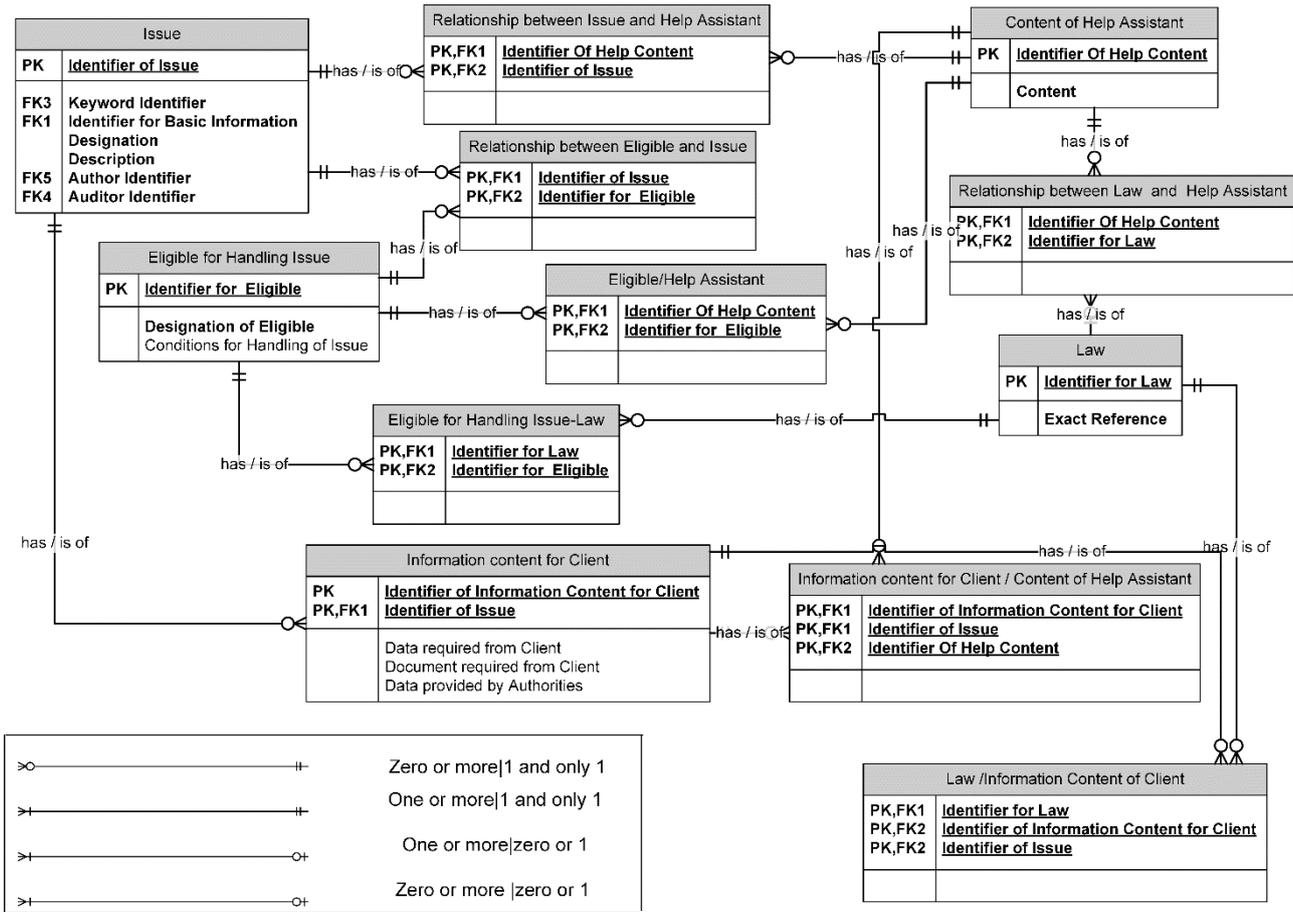


Figure 1: Entity-Relationship Model for Representation of Issues Depicted in Semi-structured Spreadsheets

The core content of Knowledge Warehouse is the database of case descriptions. Case descriptions are based on a generic document type and the instances as the extensions of the generic template are stored in the database. The graph structure of the database represents the mutual relationships among case descriptions, furthermore the connections to legal resources, the links to ontologies, references to templates of documents, forms, and to applications for filling-in forms. The graph structure permits that many-to-many and one-to-many relationships can be represented and the amendments in legal resources can be tracked easily to maintain the timeliness of legal resources.

The case descriptions of the database are linked to the legal resources contained in the *Integrated Legislative System (ILS)* and to the official forms that are required to initiate the process of public administration and these forms are stored in the *Unified Central Electronic Document Management System (UCEDMS)*. The *ILS* connection ensures that the legal resources and regulations that are required for the processing of individual cases are available to citizens or public officers in the form and content of the *National Legislation Register (NLR)*. The *ILS*, *NLR* will use the *European Legislation Identifier (ELI)* for the Hungarian legal resources to be used for the clear identification of laws and other legal instruments of public administration. This reference system makes it possible to refer to the syntactical elements of the legislative structure (legal identification, part, chapter, section (§), paragraph, list, etc.) with the necessary detail. When the legal background of a case description is retrieved, the relevant parts of the case description template are highlighted; furthermore, the legal resources in force on the date that is set and selected by the user is also displayed.

The *ILS* connection ensures that the administrators of Knowledge Warehouse will obtain immediate notifications of the changes that may happen to the legal resources and affect the case description templates in the Knowledge Warehouse. The design of the database for Knowledge Warehouse supports the solution that in the case of statutory changes affecting only parameters (e.g. number values for levies, taxes, date of deadlines, institution names etc.) changes are made automatically in case description templates under human supervision. The *ILS* as provider of the content of legal resources will automatically send a notification to the organization that is responsible for the content of those case description template that are affected by changes to ensure that the necessary changes will be made in the related case description template. In the case of totally, new legal resource that cannot be linked to any previously codified legal resources, a responsible public officer of the Prime Minister office will be contacted; the responsible public officer will initiate the necessary amendments of the database. The connection between *UCEDMS* and Knowledge Warehouse warrants that users of the Knowledge Warehouse can directly use the forms and documents stored in *UCEDMS* if the related case description has supported by business processes of public administration within *UCEDMS*. In the case of a correct user authentication, the citizen can initiate the case by completing the related form. The Knowledge Warehouse provides both citizens and public officers with information on case descriptions relying on the related legal resources. However, the various legal resources on public administration, on regulation of processes and procedures, and citizens' problem solving cannot be mapped onto each other mutually. For this reason, in order to assist the public officers and the citizens, the Knowledge Warehouse employs a higher-level abstraction of concepts within public administration and life events of citizens; this approach yield the opportunity that relevant solutions of the problem can be found without knowing the exact technical and legal terms linked to the particular situation. The basis of the operation of semantic search services that handle complex and abstract concepts is the creation of a network of relationships among the case descriptions in a graph database, the building-up of a thesaurus, taxonomy, and ontology. The information, documents and other content stored in the Knowledge Warehouse will be organized in a unified framework, namely, the interrelated cases, the legal resources and their structure, the client's life events and there is an opportunity to assign the adequate business process of public administration (where such a supporting option is available) in concert with external, related information systems (*ILS*, *UCEDMS*). Beside the continuous improvement of the Knowledge Warehouse that is supported by the before-mentioned tools, there is feedback option that is available to the public officers for each case description. The thesaurus, taxonomy, the legal and domain ontology that describes the links among individual concepts and the relationships of other knowledge elements that are related to concepts (as axioms, rules), moreover the semantic search together make sure that responses from Knowledge Warehouse are as accurate as possible for both citizens and public officers. Searching for individual words and phrases based on traditional search procedures can result in too many hits due to the number of case descriptions and related legal resources that make it much more difficult to find significant information, make the job of public officers more complicated. Ontology and semantic search significantly improve search efficiency, thus reducing time-consuming activities. The search service of Knowledge Warehouse takes into account the ongoing change in citizens / client's requirements. The on-line interface will provide the semantic search service that helps citizens find the relevant case description, document template, or related legal resources they are looking for. The Knowledge Warehouse enables legally registered and authorized organizations to provide their employees with an online editorial interface which supports the filling out the placeholders of case description templates, furthermore linking together of relevant legal resources, document templates, and case descriptions. The user interface for editing assists the process of definition of case descriptions, storing it in the Knowledge Warehouse, verifying and validating of case description by the responsible organization's staff, and approving by the public officer within the Prime Minister's

Office who is responsible for the Knowledge Warehouse. Organizations who are responsible for case descriptions will be notified about changes in related legal resources, about changes that were automatically carried out, and feedbacks from public officers within Citizens' Relationship Management through the editorial interface.

The Knowledge Warehouse requires a scheme for organizing the work of public administration to sustain the actuality of legal resources in force by members of responsible branches and sectors of the Government.

This scheme for organizing the work related to Knowledge Warehouse demands organizing of business processes of public administration such a way that tracks changes legal resources and deals with the textual information related to the given procedural act. These business processes of public administration transform the changes appearing in legal resources published in the ILS into the form that can be fed into the information system that contains the current information and knowledge by the time the legal resource enters in force.

2.2. Legal Resources Represented by XML

The *Integrated Legislative System (ILS)* and *National Legislation Register (NLR)* will apply the standards of MetaLex [11] that has been accepted by CEN/ISSS (European Committee for Standardization). Under the concept of legal resource is understood the legislation (a set of laws passed by a parliament), and all written documents that are created by a legislator and that elucidate and justify the legislation; furthermore legal rules as regulations, resolutions, directives, circulars, internal instructions created by various levels of authorities. MetaLex XML schema is intended to offer a lowest common denominator among the disparate jurisdiction-dependent and developer-specific representation of legal resources and to enforce uniform view on legal resources existing in the form of legal documents and support the interoperability and data exchange among the diverse sources to assist information system development. Fulfilling the before-mentioned set of prerequisites, MetaLex allows for XML schema extension, enhancing meta-data, cross-referencing among elements of XML documents, building up composite XML documents utilizing the referencing options, a change management mechanism that conforms to version handling that valid within legal environment, moreover a naming convention (elements, attributes of XML representing meaningful parts of legal documents) for development of software that realizes the goals.

The names of legal resources and legislative bibliographic entities should be linked to an identifying *internationalized resource identifier (IRI)* whereby (1) the document can be identified, (2) another document can be cited, (3) components of the document can be included.

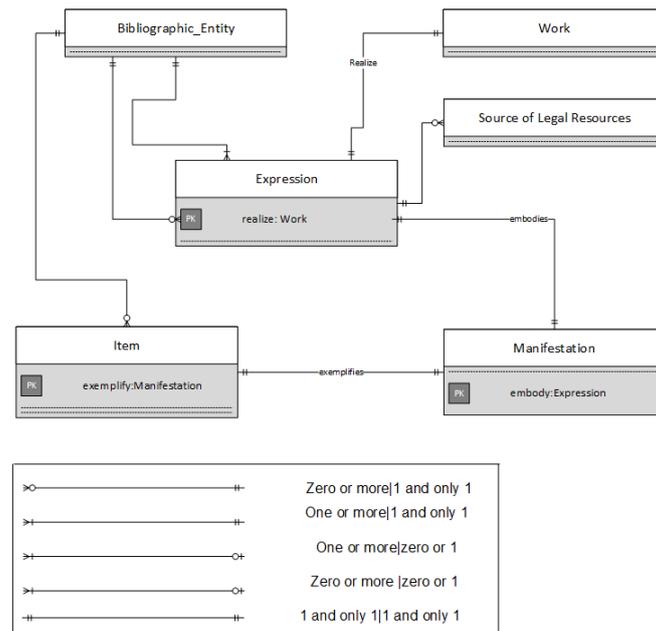


Figure 2: Relationships of Major Concepts within MetaLex (source [11])

MetaLex rigorously differentiates the source of legal resources and laws as released work from the expressions over time, expression from its distinctive manifestations of the specific legal resources; furthermore from items that are the physical representation instances of a manifestation.

There is a localized version of MetaLex XML schema customized to the jurisdiction by *Integrated Legislative System (ILS)* and *National Legislation Register (NLR)*. The customized XML schema exploits the options for enhancement of meta-data, defining an adequate content model, and elaborating a scheme for referencing and cross-referencing. *Integrated Legislative System (ILS)* and *National Legislation Register (NLR)* comply with the standard of ELI (European Legislation Identifier) that is in fact the well-known web reference schema (IRI/URI/URL/URN), there are subtleties that should consider however the resolutions of the related problem areas typically belong to the technical and implementation level.

As it can be seen in the figure (Figure 2) the taxonomy of notion commences at concept of “work” as rule codifications (law, regulation directive, resolution et.), i.e. the work of legislation. The actual textual content of a legal resource comprises the next level of abstraction, the “expression” then the manifestation, “physical representation” of the text that incorporates the codified work of legislation in the form of printed paper, PDF, HTML. Within the manifestation there are options to refer to parts, articles, sections, paragraphs etc. As it can be seen, in spite of the conceptual approach in the case of legal resources the approach concentrates on primarily on syntactical components. Nevertheless, there is an ontology that was defined so that the formal aspects of legal resources are placed into conceptual framework that provides the opportunity to build up an ontology that deals with semantical aspects of legal resources, case descriptions and the related life-events of citizens.

2.3. Relationship Between the Knowledge Warehouse and the Integrated Legislative System (ILS)

Beside the legal knowledge that appears in the form of laws and other resolutions, regulations – i.e. legal resources –, there is procedural knowledge within public administration that is similar to case-law in certain sense, thereby a semantic layer is required within the hierarchy of ontologies that can represent and grasp the legal knowledge following Tim Berners-Lee's stack of semantic tiers [3]. The technical terms that are used within case description for handling life-events of citizens and the search terms that are employed by citizens as laymen differ profoundly. Therefore, two parallel ontologies are required that support the semantic search and information retrieval. Firstly, the citizen depicts of the life-event he or she is personally involved. An ontology including the concepts of citizens is used to arrange the input data then the system with the help of ontology directs the citizen to submit the relevant characteristic of the case at hand. An ontology on legal concepts, business processes of public administration, and on the administrative procedures is required that structures case description templates, forms and document templates into the taxonomy of notion and makes possible to maintain the conceptual and logical relationships among them. The ontology for citizens' terminology and the ontology for legal notion are strongly coupled to each other.

In order to execute complex queries of citizens and public officers on case description templates it is required to bind the generic and domain level ontology concepts to factual level, domain-specific ontology that ensures the accessibility the instances within the extension of concept classes.

Integrated Legislative System (ILS) stores and publish the actual legal resources, the legal resources in force, and the changes to legal resources, moreover the new legal resources. From the viewpoint of the Knowledge Warehouse the legal resources that deals with relevant issues of public administration should be considered to update the references and check the consistency of ontological models, and if necessary initiate the required modifications at all levels of ontology automatically or semi-automatically. As the MetaLex based structure for meta-data is grounded in the conceptual classes for describing legal resources, it is rather a conceptual, ontological description of the syntactical relationships of components within legal resources. However, the case management related to life events of citizens requires a semantic interpretation of both case description templates and legal resources referenced by them. The semantic aspects can be attached to the overall structure through a disciplined hierarchy of ontologies where through the lowest level the documents of case description templates and existing cases can be accessed within the document database.

The components of a three level ontology can be as follows:

- Generic legal ontology;
- Domain ontology of public administration;
- Domain-specific ontology for life events and case descriptions

The refinement of ontologies means that the top level classes of legal ontology conform with the MetaLex naming and structural conventions of components and contents. The domain ontology and the domain-specific ontology allows the definition of semantic content whereby the documents of case description can be queried semantically, i.e. the deduction and subsumption that are represented within ontologies can be used by the reasoner subsystem.

3. Conclusion

The above outlined approach makes possible that the activities of citizens and public officers in a Citizens' Relationship environment can be supported at higher quality level by exploiting the semantic representation of concepts in relevant legal resources and case descriptions. The semantic mapping require serious cognitive and development efforts but it is possible for process improvement within public administration.

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