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The SEKT Legal Use Case Components: Ontology and Architecture

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Abstract. SEKT stands *for Semantically Enabled Knowledge Technologies* (EU-IST Project IST-2003-506826). Using previous and recently accomplished work on judicial and transnational lawyering prototypes (IURISERVICE and NETCASE Projects), we define an ontology of professional legal knowledge (OPLK) as a regular base for a multilayered architecture. The main idea is to build up an iFAQ to convey practical legal knowledge from more experienced judges to younger ones in their first appointment. This must be considered a preliminary or first approach. The ontology is still under development.

1 Introduction

Since 2002 the Observatory of Judicial Culture (OJC)[1] has been conducting several studies on judicial behaviour, reasoning and professional profiles. Its main purpose is to provide the Spanish judicial system with useful tools to improve the performance of Magistrates and Judges. This implies getting good descriptions and raw statistical and ethnographic data concerning everyday problems, focusing on the organization of the judicial settings and the management of the workflow knowledge. This is the reason why we use the term "judicial culture" to describe the whole range of cognitive skills and technical devices that are used to identify, organize and use this kind of practical knowledge. OJC joined the SEKT Consortium in 2003, with the aim of developing knowledge technologies to allow transforming document management, content management and knowledge management in mechanisms that are transparent to the user [4].

2 Empirical Work on Judges on their First Appointment

The way of becoming a judge in Spain has traditionally modelled a homogeneous body of judges (males, coming from families with legal backgrounds, and from specific areas of the peninsula). However, the need to recruit more and more judges in recent years has fostered the renewal of the judiciary: youth, feminisation, and social diversification are the distinct sociological variables of present Spanish judiciary [2] [4] [9] [10] [11] [22]. See Fig. 1, Tab.1-2.

[1]The Observatory results from a coordinate project between different research groups and universities – namely the Autonomous University of Barcelona (UAB), the University of Barcelona (UB), the Polytechnic University of Catalonia (UPC), Intelligent Software Components (iSOCO) and the directive board of the Spanish School of the Judiciary [*Escuela Judicial Española, Consejo General del Poder Judicial*]

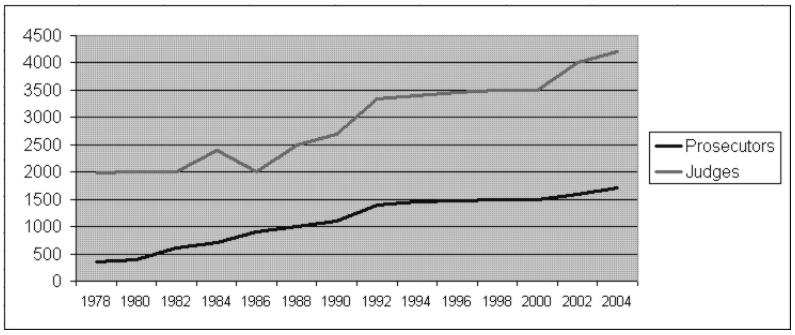

Figure 1: Numbers of Judges and Prosecutors (1978-2003) [14][22]

Table 1: Average of Spanish Judges under 40 years old. CGPJ [14].

Year	**Judges under 40 years old (%)**
1972	14 percent
1987	43 percent
1999	47 percent
2003	39 percent

Specific data regarding attitudes of Spanish judges towards ICTs can be drawn from two recent sources. On the one hand, the 2003 Barometer of the Higher Council shows that "global computerization of the Administration of Justice" ranks first among the most needed reforms mentioned by judges (81% of them think that this is a very important or rather important issue) [14]. On the other hand, data from the survey that the OCJ carried out to both inexperienced (less than 3 years in office) and experienced Spanish judges (more than 4 years in office) show that Judges' use of the Internet for professional purposes is still low (or very focused to quick checks of the Official Journal of the State and the official page of the Higher Council) [2]. See Table 3.

We have conducted two national surveys in 2003 and 2004 about the most frequent problems that young judges face in their first appointment.[2] The first results allowed us to identify three main areas in which young judges have problems: (i) the organization and management

[2]The first survey was performed on a detailed questionnaire by the young judges themselves as a planned school practice (that is to say, judges still in the Judicial School –class 52- interviewed their peers of the 49/50 class in their natural settings). The second survey implied ethnographic work and deep interviews to refine the first statistical results on 100 young judges already in charge belonging to class 53.This field research has been conducted by OJC members in 14 out of the 17 Spanish Autonomies, including the Canary Islands and Palma de Mallorca.

Table 2: Female judges [22].

Year	**Female judges (%)**
1965	none
1988	14 percent
1999	34 percent
2000	36.9 percent
2003	40 percent

Table 3: Use of the Internet. OJC [1].

		Inexperienced Judges	Experienced Judges	Total
Uses Internet	Yes	60.6	53.2	54.2
	No	38.6	46.1	45.2
	DK/DA	.9	.6	.7
Total		100	100	100

Table 4: Standard lexical forms (weight) in the young judges' answers about most frequent judicial problems. OCJ [1].

	LIBELLE DE LA	---POURCENTAGE---		FREQUENCE		V.TEST	PROBA
	FORME GRAPHIQUE	INTERNE	GLOBALE	INTERNE	GLOBALE		
1	GUARDIA	0.90	0.49	12.	13.	2.938	0.002
2	UNA	0.83	0.53	11.	14.	1.910	0.028
3	DE	9.39	8.41	125.	224.	1.764	0.039
4	INTERNAMIENTOS	0.45	0.26	6.	7.	1.539	0.062

of daily relationships within the legal office (clerks, civil servants...); (ii) the interpretation and implementation of some newly enacted procedural Spanish statutes (*Ley de Enjuiciamiento Civil*, January 2002); (iii) the "on-duty" period (called *guardia*: the week in which the entire Court in on duty tackling the preliminary investigations and procedures of the criminal cases that keep entering to the Courts). We selected this "on-duty" practical knowledge to begin with, for that it was strongly outlined within the textual statistical results (open questions). See Fig. 2. Then, we were provided with a rich material containing problems of practical procedural criminal law (adjancy pairs of questions and answers) by the Judicial School. Fig. 3 shows a translated example and the way we reformulated the initial question.

From the recent fieldwork (2004) we can draw other everyday but precise problems. Consider the following example, on the same topic:

> (1) Today a person came to me when I was on duty with a piece of paper that said... that is, a piece of paper from the doctor that said 'this person has to be taken to the psychiatric hospital urgently'; in theory it is their duty, they should take him to the hospital and yet they don't do it, they come to us with the piece of paper. This is an unclear issue. There is a protocol, but it is not clear either. If I give my permission, I should see him. The problem is that the mother wants me to take him to the hospital and the doctor... [literal transcription]

Consider some other examples, on gender violence:

> (2) I have the following problem, let's see if you came up with something: one woman files a suit (she went to hospital to get care for the bruises) but she forgives her husband, tells us that they both were drunk that night but they are very happy (to show us how happy they are she even insists on remaining in the room while he declares). She keeps saying 'no way', she is not going to denounce her husband, she has forgiven him... Since it's a public offence I go ahead and then the prosecutor gets angry with me because she appoints him to court and wants me to appoint her wife to instruct her on her rights... [the issue has no objective criminal entity; to criminalize those little things seems to me nonsense; it may even be worse regardless of the prosecutor moving forward...] [received e-mail]

(1) Question
-While on duty, an investigating magistrate receives a call from a hospital, reporting a sexual assault. The victim has still not made an official report of the incident. Procedures to be followed. Which rules apply?
(2) Rewriting
- In a case where a medical centre telephones to report a sexual assault, what must be done by the investigating magistrate who receives the call, and if the victim has not officially reported the incident, which procedure must be followed?
- If an investigating magistrate is informed by a hospital that there has been a sexual assault, what procedures must he or she follow in order to ascertain the facts of the case, and which of the established official procedures must be followed if the victim has not officially reported the assault?
(3) Reply:
As for the procedures to be followed, a forensic scientist should be sent to the hospital in order to examine the victim and to take samples. If the crime has not yet been officially reported, the judge except in very exceptional circumstances may begin no procedures. Provided that it is clear from the telephone call alone that this is a case of sexual assault and that no other crime has been committed, then criminal proceedings must be initiated by the victim.

Figure 2: Example of an "on duty" question, rewriting and reply.

(3) Some more variants on gender violence:

1. I have ordered an injunction of protection [*orden de alejamiento*][3] in favour of a woman, and some days after she comes back asking me to cancel or remove it. What should I do? Do I always have to cancel it? What may I advise her?

2. There is a couple and an injunction of protection against the husband, but the police knows that they are living together and they told me that. Any time she gets angry with him or they have some trouble she uses the injunction, the police detains him and I have to organize a hearing. . . just to find them together again next morning. What can I do? Can I modify or cancel the injunction?

3. I have been asked to dictate an injunction of protection, but this implies to leave a man on the street without a living. What can I do? How can I help this man?

4. One woman asks me an injunction of protection because of psychological abuse, but it turns out that she's never gone either to the psychologist or the psychiatrist. Should I dictate an injunction of protection?

3 Ontologies of Professional Legal Knowledge (OPLK)

This kind of problems and the type of knowledge used to solve them are not doctrinaire. Judges are experts: they take for granted the acquaintance with legal texts, textbooks or former legal decisions. What is at stake here is a different kind of legal knowledge, a *professional legal knowledge* (PLK).

In this regard, the designing of legal ontologies as the basis for intelligent IT support for judges requires not only to represent the legal, normative language of written documents (decisions, rulings, partitions to the other courts, etc.) but also those pieces of professional knowledge in which daily practice at court consists of. While ontological models to represent theoretical legal knowledge are multiple[4], there is no previous attempt (to our knowledge) to

[3] This kind of injunction forbids the man from approaching his wife (girlfriend, fiancée, relative. . .) within a specific area.

[4] Among them: (1) LLD (Language for Legal Discourse) [19], [20]; (2) NOR (Norma) [26] [27]; (3) FBO (Frame-Based Ontology of Law) [16] [17] [30] [31] [32] [33]; (4) FOL (Functional Ontology of Law) [28] [29]

construct what we call Ontologies of Professional Legal Knowledge (OPLK) [4] [6] [23]. This is not surprising, since ontologies are purposely guided. There are no "neutral task free" ontologies [1][3].

Professional knowledge of a legal topic (such as e.g. gender violence) involves particular knowledge of: (i) statutes, codes, and legal rules; (ii) professional training; (iii) legal procedures; (iv) public policies; (v) everyday routinely cases; (vi) dealing with practical situations.

We may point out several properties of PLK. PLK is: (i) shared among members of a professional group (e.g. judges); (ii) learned and conveyed formally or most often informally in specific settings (e.g. the Judicial School, associations, courts...); (iii) expressible through a mixture of natural and technical language (legalese, legal slang); (iv) non-equally distributed among the professional group; (v) non-homogeneous (on individual bases); (vi) universally comprehensible by the members of the profession (identification principle).

One of the main features of PLK is that it is context-sensitive, anchored in courses of action or practical ways of behaving. In that sense, it implies: (i) the ability to discriminate among related but different situations (e.g. when is it really needed or required an injunction of protection or take-away to prevent a women to be injured or murdered by her husband?); (ii) the practical attitude or disposition to rule, sentence or make a decision; (iii) capacity to relate new and past experiences of cases; (iv) the capacity to share and discuss these experiences with the peer group.

4 The IURISERVICE Ontology

An ontology for Spanish Judges in their first appointment should be able to capture all those features. Under Spanish law, there is a judge [*juez instructor*] who must conduct the investigation of the police officers. When the judge is on duty he has to make a lot of quick decisions about the facts and the cases that have been reported to the police or to the court. Therefore, the most usual set of questions take for him the following form: "What I should do in such and such situation"?

Judicial experience tries to offer an answer. Judicial PLK contains a repository of know-how solutions, next steps to take, ready made procedural knowledge for a huge amount of similar cases which are not covered by statutory provisions.

Our ontology for this professional knowledge (OPLK) is based on the common ground of knowledge that any young inexperienced judge shares with the more experienced ones. We inferred some matching concepts from the bulk of materials that we had before us (hard cases, rare cases, legal interpretations, legal analogies, professional attitudes, similar doubts, similar questions, and common standards).

The most general notion that stands for all kind of proceedings under the Spanish law is *proceso* (process, trial, procedures, proceedings). This notion constitutes the kernel of a wide network of related concepts that shape the backbone of the judicial culture. The dynamic flow that this concept allows is described in the following tree. Fig. 4.

There are several notions close to OPLK in the cognitive science and the ontological engineering literature. "Situated cognition" [7], "organizational memory" [12], "corporate ontology" [24] and "competency questions" [15] are different terms used to emphasize that the ontology must capture the collective dynamic flow through human-machine readable shared knowledge represented by graphs or trees.

Judges use this structure as a kind of cognitive tool for a quick understanding of the problems they face and the facts that are submitted to them. They can select the appropriate legal procedure through this framework. Therefore, going along of these guidelines, they

; (5) LRI-Core Legal Ontology [5] [13] ; (6) IKF-IF-LEX (Ontology for Norm Comparaison) [13]; (7) ODSS (Ontology for Decision Support Systems) [35].

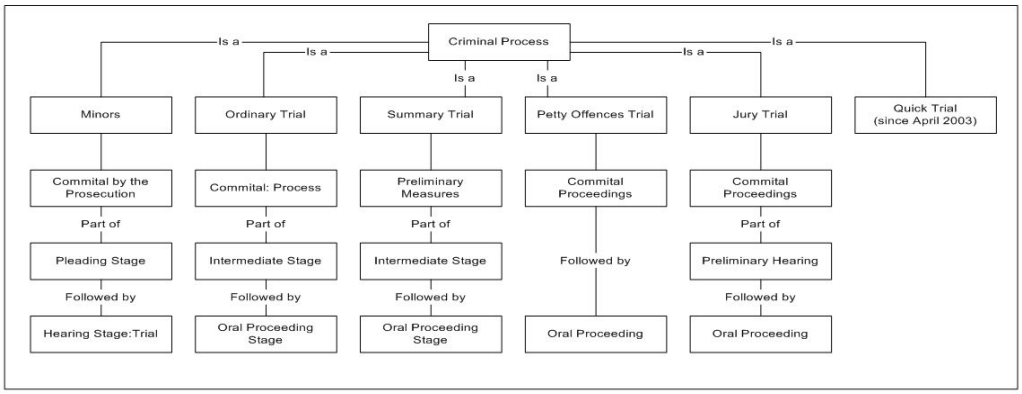

Figure 3: Preliminary ontological representation.

may think of what to do first.[5] We assume that our preliminary OPLK, even if still light way and only formulated in a semiformal language, captures the templates that judges must fill in almost automatically by the bulk of cases and situations that they encounter while being on duty. Therefore, the structure of the OPLK will allow the system to reply through the same set of basically related concepts that users (young judges) will have in mind in their queries.

5 The architecture approach

In order to build a scalable and useful FAQ system, the following requirements have been identified:

- Judges should not be bothered with a complex user interface. A simple natural language interface is probably appropriate.
- The process of understanding the input question should be based on semantics rather than on simple word matching. An ontology can be used to perform this semantic matching of questions.
- The questions included in the system should be of high quality, i.e. be rather exhaustive and reflect the actual situation. An extensive survey with more than 250 Spanish judges forms the basis for the questions.

The final software is a web based application that retrieves answers to questions in the legal domain. It will provide judges access to frequently asked questions through a natural language interface. The system will respond with an ordered list of similar question-answer pairs that might solve the problem of the judge. The advanced question understanding in the legal domain will be performed thanks to the ontology previously described. The offered answer are supported and extended by existing cases extracted from local specific databases.

In more detail the figure shows how the system that we are building manages two independent kinds of knowledge.

On one hand, it manages the expert knowledge related to judges' experience, in the form of a repository of frequently asked questions and an ontology representing this kind of knowledge, built by the UAB team, the Ontology of Legal Professional Knowledge (OLPK). This

[5] We can also describe this complex conceptual structure *(proceso)* as triggering general cognitive schemas and scripts or prototypes. A *schema* is an organized framework of objects and relations who has yet to be filled in. A *script* is a set of expectations about what will happen next in a well-understood situation [25]. A prototype is created through the filling in of the slots of a schema with an individual's standard default values [8].

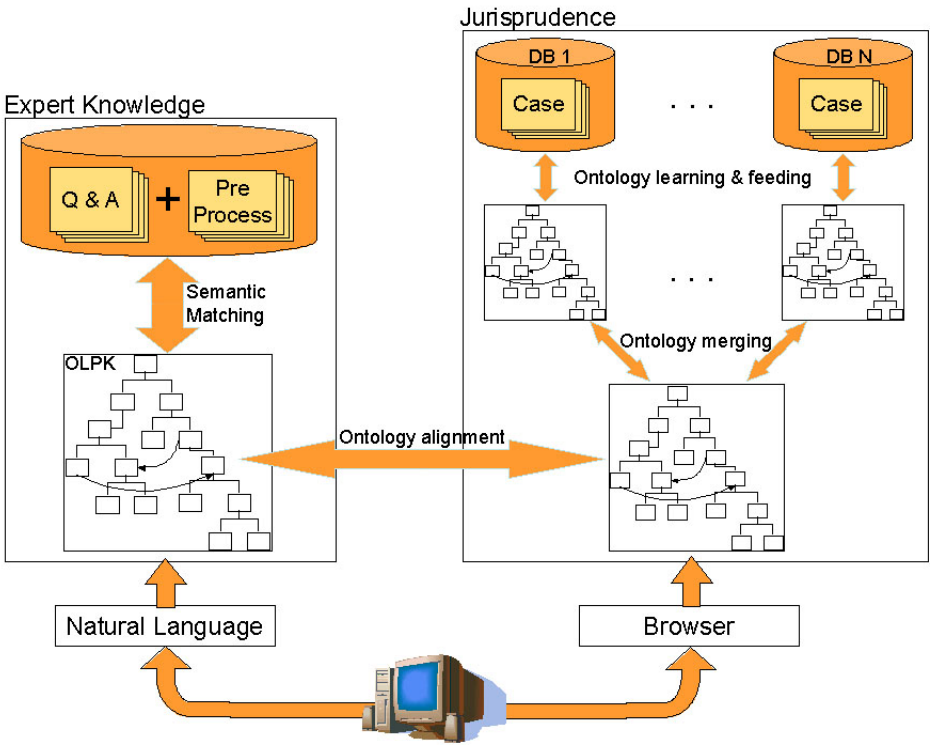

Figure 4: An overall architecture for the tool

kind of knowledge should be sufficient for the system to be able to answer the questions posed by the judges in their first appointment. This is represented on the left-hand side of the figure. The user accesses the system using a natural language interface, thus asking the question as she would ask to an experienced judge. The question is analysed in order to detect the relevant concepts, using the OLPK as background knowledge. The set of concepts obtained is matched against the questions in the repository, to check which the best possible available answers are.

The right-hand side of the figure shows the other kind of knowledge considered in the system, the existing jurisprudence. For a judge, as important as knowing which action to perform is to know how he/she can justify this action, who took it before and why. This is exactly the kind of knowledge that is managed here. The application has access to a number of databases of cases (the exact number has not yet been decided). Each case contains the description of a situation, the applicable law for that situation and the resolution dictated by a judge. Each database contains the cases produced by a specific court, or cases related to a specific subject. Each of these databases would me modelled with an ontology, and all the ontologies representing each of the databases would be merged to obtain a single ontology, the jurisprudence ontology, representing the knowledge contained in the cases.

In order to connect the two kinds of knowledge, and be able to detect the cases that can be useful to justify the answers in the FAQ repository, it is necessary to align the concepts in the two main ontologies of the system, the OLPK and the jurisprudence ontology. So, when a user selected a justification for an answer of the system, the system would check the concepts of the OLPK that appear in the answer, transform them into the corresponding set of concepts in the jurisprudence ontology, and retrieve the appropriate cases that contain those concepts.

Besides this procedure, it would be desirable that a judge could browse the whole collection of cases based on the concepts; this is, based on the jurisprudence ontology.

6 Work in progress

The work introduced in this paper describes the SEKT project which develops semantic web technologies and knowledge management technologies in the legal domain. Young judges, in their highly knowledge intensive work, will be able to use an intelligent support decision system based on the professional experience.

One of the main challenges is the ontology development task, where both knowledge engineers and domain experts have to capture the needed professional knowledge in a semantic model for question understanding and document retrieval purposes. At this stage of the project we start iterative cycles of producing a domain ontology and validating the usability of the overall application. Each cycle is tested with focus groups of potential users constituted by experienced and recently graduated judges.

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