



## **9th BILETA Conference**

### **The Changing Legal Information Environment**

**11th & 12th April 1994**  
**Scarman House**  
**University of Warwick**  
**Coventry**

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## **Automated Training of Legal Reasoning**

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Keywords: Artificial legal reasoning, Intelligent tutoring system, Administrative procedural law

Abstract: A theory of artificial legal reasoning is described together with the consequences the assumptions have on knowledge representation and the architecture derived from this view. Some extensions, refinements and adaptations necessary in order to be able to use the architecture to develop a system to teach legal reasoning to law students are described. The focus of the research on legal problem solving is on formulating hypotheses about modelling legal problem solving for educational purposes and testing these hypotheses in an experiment. The experiment is the development of an intelligent tutoring system to train law students to solve problems in administrative procedural law.

### **1. Motivation of the research**

The motivation for this research is twofold. The first motivation is to provide law students with an opportunity to learn how to solve legal problems, as well as to train their legal problem solving skills. The way in which legal problem solving is receiving attention at this moment in Dutch legal education is too restricted (Muntjewerff, 1994). Furthermore there is hardly time left in the official curriculum to spend on training. The training system under construction, ROSA, offers law students the opportunity to apply their support knowledge, provided by the teachers and acquired through studying texts, in solving 'real' legal problems.

The second motivation for this research is to study artificial legal problem solving. To be able to construct artificial legal problem solvers, legal problem solving has to be studied and theories on artificial legal problem solving have to be constructed and tested.

The research undertaken will be described in the next two paragraphs. The application under construction serves two purposes. One is to have an application with which law students can practice legal problem solving in administrative procedural law. The second is to develop an application as an experiment for testing the proposed theory on artificial legal reasoning.

### **2. An application for training legal problem solving**

The ROSA system is an application for training law students legal problem solving in the domain of administrative procedural law. The ROSA system is able to provide law students with a tool and environment with which they can solve 'real life' legal problems, problems that are not too tailor made and in which the law student is coached in the process of solving the problems. The idea behind ROSA is that law students need to have an opportunity to become more skilled problem solvers. Therefore they need training. A computer tool can provide training and coaching (during

training sessions).

## 2.1. The domain

The domain of the system under construction is administrative procedural law. This is a complicated part of law, which has a great impact on society. Law students have difficulties grasping the essence of this field and have difficulties solving problems in this field of law. In the domain, aspects of substantive as well as procedural law are involved. Next to assessing situations, the planning of procedures and the construction of various documents play an important role in the problem solving process.

The General Administrative Law (Algemene Wet Bestuursrecht in Dutch) is the legal source in which the norms are coded. This part of law arranges the relations and interactions between citizens and the administration. These relations and interactions are: the primary decision making of the administration regarding a request made by a citizen; the way in which the legal protection is arranged; the procedures to follow, both for the citizen and the administration, in the course of decision making and legal protection.

A request of a citizen to the administration could be, for example, for a permit to put a dormer (window) on the house. Or a request to fell a tree. The administration in turn has to take a decision about this request. When the administration rejects this request, the citizen can lodge an objection and under certain conditions has the right to appeal.

### More on administrative procedural law

In administrative procedural law a set of instruments is provided for local and governmental authorities to accomplish certain objectives. Next to that administrative law provides guarantees for citizens as for example: public nature and participation as guarantees preceding a decision of an authority and legal protection as a guarantee afterwards. At the request of one or more citizens, a more or less independent authority checks if the administration follows or followed the rules. In a conflict between a local or governmental authority and a citizen, there has to be a judgement by an independent court in the end (the claim of proper legal protection is founded in article 6 of the European Treaty on Human Rights). However before the decision reaches the court, the administration itself may be asked to give an opinion on the attacked decision of the administration. Generally speaking there are two courses of action for a party concerned:

- To start administrative appeal. This means that a decision taken by an administration will be tested by another administration (most of the time one higher in the hierarchy) on request of the party concerned.
- To make objections. The administration which has taken the decision will reconsider the case on request of the party concerned.

In both cases there is no independent court involved, but even so this is called legal protection.

The body or bodies of authority which have to test or reconsider the decisions taken, are stated in the General Administrative Law. The system is quite complicated. The legislator has stated different factors which determine which procedure has to be followed. These factors are:

- The nature of the disputed actions of the authority;
- The field in which the disputed action was taken;
- The quality of the party concerned;
- The type of administration that has taken the decision.

The procedure of making objections (and asking the administration to reconsider the decision) is a

pre-procedure for admission to the court. The recent reorganisation of courts in the Netherlands has provided new administrative colleges in the law courts.

## **2.2. Training legal problem solving with ROSA**

The ROSA system can be used as a training tool during and after the theoretical knowledge transfer in lectures and working groups. The support knowledge has to be provided by the teacher and acquired by studying legal texts. The knowledge to be taught should consist of the legal concepts, the methods, the structure of the legal system, the meaning of the field of law and the kind of problems involved. The system provides the opportunity to train the problem solving capability and to put the support knowledge into practice in the process of solving legal problems. In this legal problem solving process, issues that are normally left out in cases as they are used in legal education in the Netherlands today, are taken into account. In (Muntjewerff, 1994) an analysis of the shortcomings of cases as they are normally used in Dutch legal education is described in more detail. The ROSA system, for example, does not start with a restricted, tailor made case, but provides the student with a document. This can be a letter, a request or a (incomplete) file. Also a variety of tasks is supported by the system. The student has to assess the situation using the document(s), plan the course of action, construct a document in return (for example a letter or a decision) and send this to another person (depending on the documents received and constructed). In the course of the problem solving session, different kinds of activities have to be carried out by the student, activities based on general tasks as assessment and planning.

The student can choose the position from which she wants to start the problem solving, by selecting one of the various agents who play a role in administrative procedural law. The student can choose to be a citizen, a civil servant, the administration, an administrative judge etc. The student can also select a part of the problem solving process, can select an aspect which she finds difficult or wants to train more intensively.

The ROSA system provides the student with the opportunity to plan a procedure, to plan in time (periods), to handle different kinds of documents, to construct a file with the relevant documents and take decisions on the basis of the documents and files.

There are two ways in which the problem solving process can start. The system can provide the role the student has to take, the phase in the procedure or the document, or the student can select one of the roles, select the different phases in the procedure or select different aspects of the procedure and select different documents.

The ROSA system provides students with a tool to practice with 'real' problem aspects in which attention is given to legal methods and theoretical issues concerning administrative procedural law. The problems are not restricted to applying rules to facts that are already selected in advance.

In the ROSA system the student has to practice. The learning goals (what the student has to learn) and the difficulties related to these learning goals (what kind of misconceptions and mistakes do we encounter, what are the specific problems within this domain) are the starting point in the selection and creation of problems to present to the student.

## **2.3. System Architecture**

The ROSA system is an intelligent tutoring system but, as most of these intelligent tutoring systems, the system does not teach a (new) subject, but coaches the student during a problem solving session. In this case it is more an intelligent training system.

An intelligent training system consists of several components each with a specific function. Intelligent indicates the fact that the system is knowledge based. The system contains knowledge of

the domain (domain representation), it contains knowledge of the misconceptions and mistakes students are likely to make in this domain and within this problem solving task, it contains knowledge on how to diagnose these misconceptions and mistakes (diagnoser) and it contains knowledge on how to react to these mistakes and misconceptions (coach).

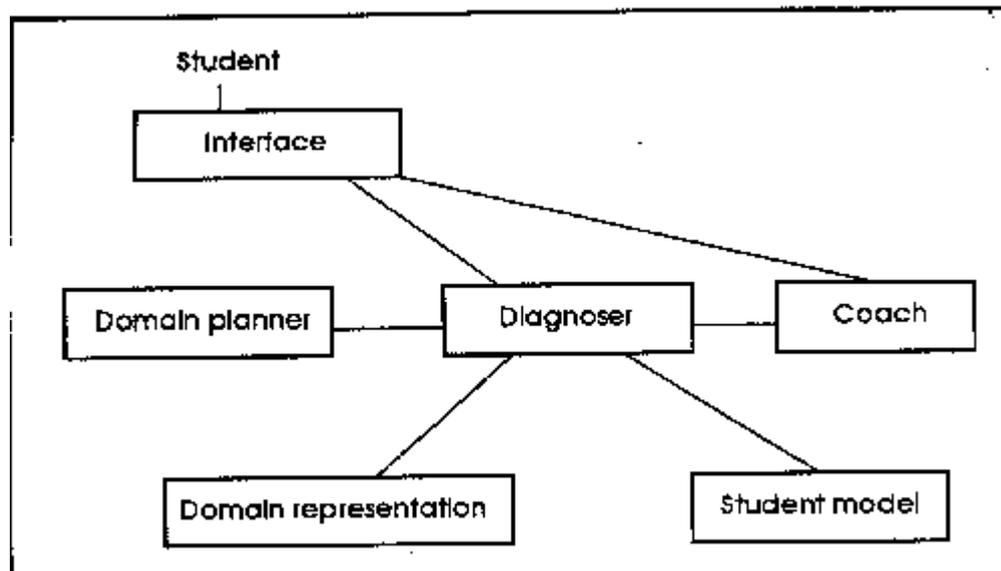


Figure 1: Architecture of the ROSA system

### The interface

The interface provides the communication between the student and the system in a variety of ways. This communication function is of main importance, because teaching is communication. In the ROSA system a document database, a document editor and a document handler, a plan ruler, and a time ruler will be part of the interface. The document database contains a large variety of documents relevant in the domain. A document can be selected as the beginning of the problem solving process, or can be selected as an example or can be selected to compare a constructed document with. The document editor is a tool to construct documents (write a letter for example). The document handler is a tool with which the student can manipulate documents (send a document to a person or institution for example). A plan ruler visualises the steps in the procedure and a time ruler visualises time and periods.

The problem to be solved by the student can be selected by the student or be provided by the system. This selection can be controlled by the knowledge the system has of the student (student model). The student is able to select a role in the problem solving process (a citizen, the administration or a civil servant for example), to select a part of the administrative law domain, to select a phase from the procedure, to select a document from the document database. These choices can be made by clicking on a diversity of icons (for example a role icon).

### 3. The methodology used in constructing ROSA

In constructing the ROSA system a methodology for constructing knowledge based systems, CommonKADS, is used (Schreiber, 1993). This methodology is useful for developing tutoring systems as well (Winkels, 1992). Developing a knowledge based system is viewed as a modelling activity and is guided by the following principles. The modelling activity results in multiple models (for example a task model, a model of co-operation, a model of expertise and a design model) and the knowledge is described at the knowledge level, providing an implementation independent specification of the required problem solving behaviour in the knowledge base under construction.

The task model consists of a decomposition of the real life task into a number of primitive tasks and a distribution of tasks to agents. Building a model of expertise is a main activity in the process of constructing a knowledge based system. The model of expertise specifies the desired problem solving behaviour for the target knowledge based system through a categorisation of the knowledge required to generate this behaviour. The model of expertise in CommonKADS contains four knowledge categories: domain knowledge, inference knowledge, task knowledge and strategic knowledge.

The model of co-operation together with the model of expertise are the conceptual model. This conceptual model is an abstract description of the objects and operations that a system should now about. The reusability of model components, a main issue in the methodology, is brought about by providing a typology of primitive inferences and through generic models of tasks, a library of interpretation models.

The problem solving is modelled using the CommonKADS interpretation models for assessment and planning (Schreiber, 1993). An interpretation model is an abstract conceptual model of a set of problem solving methods in terms of inference steps. These models need to be refined and adapted to specific legal assessment and legal planning in the domain of administrative procedural law. For this adaptation the methods described by (Crombag, 1972, 1977) and (Abas & Broekers-Knol, 1985) for solving legal cases, and the thinking aloud protocols of legal practitioners solving an administrative procedural law case are used.

Solving legal problems has aspects of assessment, a specific situation has to be assessed with an abstract norm set, and planning, the course of action to take to reach a certain goal has to be planned. Assessment consists of case abstraction and norm application. Case abstraction is concerned with translating a case description into abstract terms to be able to compare the case with the abstract norms. The assessment and planning models in the CommonKADS library of interpretation models need to be specialised towards assessment and planning in administrative procedural law problems.

#### **4. Theoretical foundations of the research**

Knowledge based systems and intelligent tutoring systems are artificial problem solvers. In this paragraph the assumptions and the theoretical ideas concerning artificial legal reasoning and the implications the assumptions and the theory have on the architecture and on knowledge representation are described. In (Breuker, 1990) a theory on artificial legal reasoning is described in detail. This theory is not a psychological theory, but a theory on *artificial* legal reasoning. The research is concerned with identifying the different (abstract) functions in legal reasoning tasks and to develop computational models which realise these functions.

The assumptions underlying the theory are that in legal reasoning a separation should be made between different kinds of legal knowledge. A distinction between 'real' legal reasoning (applying rules) and reasoning about events in the world can be made.

The real legal reasoning, when no reasoning about the world is concerned, should be viewed as a process of rule application and conflict resolution.

The consequences for knowledge representation are that the regulations should be represented separately from the representation of the world governed by the rules concerned.

This is reflected in the architecture of the artificial legal reasoner. The architecture consists of two knowledge bases. The legal source knowledge base represents the regulation(s), the world knowledge base represents the world governed by the regulation(s). The world knowledge base consists of objects, agents and actions that describe a system in the world. The world knowledge base provides situation descriptions that can be processed by the regulation applicator. The artificial

legal reasoning starts when a situation description is presented to the regulation applier. The proposed architecture needs to be extended with regard to different legal tasks and with regard to supporting the function of legal education. Research has to be done on representing procedural knowledge and on reasoning with procedural rule sets. Attention has to be paid to representing legal knowledge for the purpose of teaching because there are different representations necessary for representing knowledge in a knowledge based system in comparison to representing knowledge in an intelligent tutoring system (Clancey, 1983; Clancey, 1988; Winkels, 1992). The focus within the development of ROSA is on the representation of procedural rules and on representing knowledge for teaching.

### The representation of the supporting world knowledge

In representing the world knowledge, typologies are used. The knowledge is derived from the definitions in the articles of the regulations concerning administrative procedural law. The type hierarchies are defined as follows:

*is\_a (Subtype, Supertype)*

*is\_a (administrative\_appeal, appeal)*

*is\_a (administrative\_court\_appeal, appeal)*

*is\_a (appeal, legal\_protection\_in\_administrative\_law)*

*is\_a (objection, legal\_protection\_in\_administrative\_law)*

### The representation of the regulation knowledge

For every article from the regulation(s) involved there will be one rule in the knowledge base, as is proposed by (denHaan & Breuker, 1991). In that research however the norms from a traffic regulation were involved. These are obligatory and permissive norms (Brouwer, 1990) or primary rules (Hart, 1961). The regulations which are the subject of the ROSA system contain for a large part power conferring norms (Brouwer, 1990) or secondary rules (Hart, 1961). In ROSA research is undertaken to find out if the way in which the architecture of the artificial legal reasoner provides legal reasoning takes this kind of legal reasoning into account or that an extension should be made.

*article (number*

*subject (name, type),*

*(condition (arguments) | or &*

*condition (arguments)*

*=>*

*(conclusion (arguments) | or &*

*.....*

*conclusion (arguments))).*

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