

## THE JURICAS-SYSTEM: NEW APPLICATIONS AND FUTURE DEVELOPMENTS

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### 1. Introduction

In recent years the Workshop for Computer Science and Law (Erasmus University Rotterdam) has gained a lot of experience in the development of legal computer advice systems with the aid of the self-developed JURICAS shell. JURICAS stands for JURIdical Computer Advice Systems. After bringing six ready-made legal computer advice systems on the market, the Workshop for Computer Science and Law is now selling its 'empty' JURICAS shell as well. The advantage is that experts in organisations can build their own computer advice system, which makes it possible to build a system that fits all specific needs. Recently, such a JURICAS system has been developed by a social security service in the Netherlands, on the basis of the Dutch Social Security Act. In this paper, a description of the existing 'ready-made' systems is given, followed by an outline of the project at the social security service. After that, some of the problems which are common to the building of legal knowledge systems are discussed. A research project that is now carried out at Erasmus University aims at solving some of these problems. This research project is described in the last part of this paper.

### 2. The JURICAS project

In 1978, a start was made at Erasmus University on the designing of a computer programme which could support the user in the making of juridical decisions. In 1982, a prototype of such a programme came into existence. It was named SENPRO, an abbreviation of Sentencing Programme.<sup>1</sup> The first decision process that was analyzed and made suitable for this programme was the sentencing model constructed by Hulsman, a professor of criminal law in Rotterdam.

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In the years after 1982, the prototype SENPRO was subject to further testing. New specifications were developed which were aimed at producing a SENPRO which would be satisfactory to a larger public. By adjusting the control programme for use on a Personal Computer, it became available to a wide group of users. The control programme (in fact the advice system 'shell') got the new name of JURICAS.

#### 2.1. Description of the system

A JURICAS system consists of at least 4 parts: the JURICAS control program and 3 separate data files. These data files are:

1. the decision file. This is the main file which contains all questions and statements which appear on the screen. The author has endeavoured to cover all possible combinations of facts and answers in this file. It is therefore comparable to the knowledge base which is used in most expert systems.
2. the information file. The author of an advice system can put more general information about the legal subject of the system in this file. This information can be obtained at any time during the decision process (in an on-screen window) and gives the user access to relevant but less specific information. It is structured and accessible as a simple database. It has an index but it can also just be browsed through.
3. the help file. This file contains instructions to the user with respect to the technical functions of the JURICAS system. This information appears in a separate on-screen window, and can be obtained at any time during the decision process.

The JURICAS control program (or 'shell' program) is written in Turbo Pascal and Assembly language. This program reads the decision file which not only contains all kinds of texts (to be displayed on the screen) but also special control symbols and lines. The program is

so fast it can be used on all kinds of (IBM PC compatible) personal computers, even on early XT-machines.

Lawyers always use texts. When they give legal advice, this usually happens after they have studied certain legal texts. Also, legal decisions are based upon legal texts. This is why texts play an important role in JURICAS systems. Texts that are displayed on the screen, and which can contain information, questions, but also conclusions, form the backbone of the JURICAS decision file. This file is made up of a (usually large) number of items. Every item can contain a text, which will be displayed on the screen whenever the item is processed by the program. Every item also contains one or more control lines. Some of these control lines contain in fact a kind of production rules, in which predicate logic is used to decide what will be the next move of the program, or in other words, what item will be processed next.<sup>2</sup> By posing questions to the user and responding to the answers given the system eventually reaches a conclusion, which contains the legal advice from (the author of) the system to the user.

## 2.2. Ready-made JURICAS systems

Since 1987, five ready-made JURICAS systems have been brought onto the market and the sixth will follow soon:

- Remanding in custody
- Dismissal law
- Inheritance law
- Sentencing according to Hulsman
- Military service
- Travel documents (soon).

Apart from the subject a computer-advice system is about, it is sometimes difficult to give an unambiguous solution for a legal problem on the basis of legislation, case law and literature. To overcome this difficulty the author of the JURICAS system can give a solution which in his opinion is correct, and give reasons for his solution to the user of the system. An alternative is that the system asks the user to make a choice from possible solutions. This latter option is often used in ready-made JURICAS systems.<sup>3</sup> The fact that the user is asked to make a choice does not mean that the system is of no value or not practicable, because without the system the user may not have considered these alternatives at all.

During the development of a ready-made system the builder must keep an eye on the target group, so the level of the system is fitted to the user. Since it is also expected that such a system handles special cases and exceptions, the analysis of the legal subject is even more complicated and time-consuming.

## 2.3. Self-developed JURICAS systems

The use of the ready-made JURICAS systems stimulated some users into wanting to write such systems themselves. As a result of this and other reasons, the Workshop decided, in consultation with the publisher Royal Vermande, to bring the 'empty' JURICAS shell onto the market accompanied by a tutorial course on how to make your own legal computer advice system. During the course the student is taught how to make a system that fits the needs of his own working environment.

After some JURICAS courses it became clear that those who develop a computer advice system for their own use do not wish to build a system that thinks of everything and is based on legislation, case law and literature, but one that supports them in making more or less routine legal decisions. These users make a lot of similar decisions every day, which all concern the same aspects and require a printed decision. Although a legal basis is present and often case law too, the authors base their work on practical knowledge. They reason that the system does not have to follow all legal rules exactly, as in practice all the legal rules are not strictly applied. The aim is to reach a sound decision. Unlike authors of ready-made JURICAS systems, those who implement an advice system themselves are therefore in a better position to implement a solution in the computer advice system, even for a situation where it is difficult to give an unambiguous solution on the basis of legislation, case law or literature. This is partly due to the fact that the system only has to reach correct decisions within a particular organisation and is not valid for the whole legal field.

The goal of these authors is therefore not to build a system that gives a solution for all cases, but a system that only handles the frequent cases. If a special, rare case which has not been implemented is presented to the system, the system reports this and the user has to make his own decision. The author works economically; if an advice system can be written that, for example, solves 90 percent of the cases, and the system can be written in an amount of time of which the costs can easily be recovered, it is desirable to write the system. The time investment for the other 10 percent would be too much to recover the costs and should not take place. An example of such a self-developed system is the project for a social security service that will be described in section 3.

## 2.4. Reasons for the development of legal computer advice systems

The development of legal computer advice systems is not the first goal of the Workshop for Computer Science and Law. It is a derivation of the research done by the Workshop, in which jurimetrics plays a prominent role. Jurimetrics can be defined as "empirical

legal science". It concerns itself with the study of syntax, semantics and pragmatics (and the relationships between them) of demands and authorizations issuing from state organizations [De Mulder 84b]. By studying the syntactical, semantical and pragmatical aspects of law a contribution can be made to increasing the body of empirical knowledge about the law. If more empirical knowledge is available, it will be easier for a legal computer advice system to reach an unambiguous solution with regard to cases which had previously seemed ambiguous.

Although the development of legal advice systems itself does not contribute to increasing empirical knowledge directly, these systems are interesting because during their design gaps in what we know about law become visible. This can indicate the way (empirical) legal research will have to take in years to come.

### 3. A Computer-Advice System for Social Security Law

In this section an example is given of a legal computer-advice system which is, at present, being used in practice. The system helps with the processing of requests for social security. It was developed by a social security service<sup>4</sup> on its own account, with the use of the JURICAS software which was developed by the Workshop for Computer Science and Law. Before the advice system was put into use (early in 1991), a large number of user tests took place which had to show if the system works in practice.

What is special about this new computer-advice system is not so much its subject (other systems deal with Social Security Law too)<sup>5</sup>, but that it was built by the experts themselves, namely the employees of the social security service where the system will be used. A big advantage of this method is, of course, that no interaction with a 'knowledge engineer' is needed. A possible source of misunderstanding during the construction of the system is avoided in this way, while the involvement of the employees of the organisation with the project is of course larger; those who are building the system now, will have to work with it themselves later. Maintaining the system - adding new legislation, but also tuning the system to users' demands - will be much easier when this can be done by the organisation's own employees. It is also expected that the system will be accepted more easily by the users.

To make it possible for a domain expert to build his (or her) own computer-advice system, it is important that certain conditions are met. In the first place, the system has to be very user-friendly, not only to the end user, but also to the author. In JURICAS, this is achieved by providing the author with a number of special tools, all of which help in constructing, modifying and testing the prototype system. In the second place, it is very important that authors of a system can rely on the fact that support will always be

available when they run into trouble. And in the third place, especially with legal computer-advice systems, it is of importance that the way a system is set up more or less resembles the way lawyers usually work. As they are used to stating the grounds for the choices they make, the system has to give them the opportunity to do so. When they want certain background information to be at their disposal, the system has to provide for this.

Advice systems that are built using the JURICAS software have an important advantage. Their starting point is the implementation of rules and regulations, not merely the statute law that underlies it. Therefore JURICAS systems can be tailored very well to the needs of the organisation by which they will be used. Even the most detailed implementing orders can be included to produce a really complete system.

#### 3.1. Nature of the project

The project at the social security service came about in the following way. In 1988, a publication on advice systems in law led people in the service to wonder if such a system could be of use to them too. The expectation was that uncomplicated cases could be processed more quickly, so more time would be available for more complicated matters. The system would also possibly reduce the number of errors. These objectives will be discussed later in this section.

An inventory of the market for knowledge systems eventually led to the decision to use the JURICAS system. Important considerations which played a role in selecting JURICAS were, amongst others, the fact that not only an 'empty' JURICAS shell, but also ready-made systems could be obtained immediately (so that the achievements of the software could be estimated well) and that a training course for the JURICAS language was available for those who wanted to build their own systems. An employee of the social security service followed this authors training course and he and a colleague were for this purpose exempted from their normal duties to build a first demo system. After this system was approved, the building of a fully fledged advice system for the social security service was started. In August 1990, this system was so far advanced that it could be tested in practice, and in the beginning of 1991 the system was put into actual use.

#### 3.2. Starting points

The authors of this advice system were of the opinion that it was not very sensible to build a system which can *always* solve *all* cases. In daily practice, cases that demand an expert's attention always occur. But most of the cases (often as many as 90%) can be handled in a routine way. For most social security services in Holland this is the case: most of the decisions that are

made (for example by welfare officers) follow directly from factual conditions. When a large part of someone's work consists of routine work, this can of course lead to problems: not only is this felt to be unpleasant and undesirable by many people, but it is also possible that cases that look simple and standard at first sight are dealt with too fast, while the one point that makes this case different is overlooked. In other words: in a flood of routine cases, the one case that requires special attention is recognized less easily.

The fact that there is routine work also has a positive aspect. An important point about routine cases is, of course, that they have many things in common. And it is this characteristic that makes it possible to use an automatic system (for instance a computer-advice system) when dealing with cases like these. One important point has to be considered here: how can the small number of special cases be discerned from the large mass of routine cases? A computer-advice system can provide a solution; by posing specific questions it can investigate how special a case is. As much time has been saved on the routine cases, the user now has sufficient opportunity to use his knowledge and experience for this special case.

### 3.3. Purpose of the system

The purpose of the computer-advice system that was developed by the social security service is particularly to improve the service towards clients. The average time taken to deal with a request for a social security payment will become shorter. As the system takes over part of the routine work, employees have more time to talk to clients. And in addition to this, the quality of the decisions taken will improve as, *inter alia*, the system works as a 'checklist', and so prevents certain facts being overlooked or that certain information has not been obtained when talking to clients. Calculation is a thing that computers do well, so the checking of ages, terms and so on is also a point where the system can save time.

The programme that is presently being tested has the following functions:

- input of client data, during which no more and no less data are asked than is necessary for taking the decision
- checking of the internal consistency of the input data, making calculations and drawing conclusions
- reporting of the conclusions of the system, on the screen or on the printer.

### 4. Advice systems vs. expert systems

When the development of legal *knowledge based* systems is discussed, it is implicitly assumed that legal *knowledge* is available. In this context *knowledge* is usually equated with empirical knowledge. Yet, this is exactly the shortcoming in the field of law; there is little empirical knowledge about law, and sometimes no empirical knowledge at all is available on a specific legal subject.<sup>6</sup> Jurimetrics research can play an important role in increasing empirical knowledge about the law. Research is called empirical and scientific when it is aimed at increasing our knowledge of the world of experience. Knowledge itself has to be gained systematically and has to be falsifiable.<sup>7</sup> Empirical knowledge is formed on the basis of observations (measurements) which are obtained by a systematic perception of objects in the world of experience.

Since this kind of research is rare in the field of law, the development of a legal knowledge based system will not be practicable in the short term. Only if the term 'legal knowledge based system' is interpreted as 'a system that provides assistance in solving legal cases' or as 'a system that provides legal information' will it be possible to build a computer system with legal contents. Such a system, however, does not say anything about the world of experience, for that empirical knowledge would be necessary, but restricts itself to the opinion of the author (or authors) of the legal subject. The term legal computer advice system is better suited for such a system and for this reason the terms 'Expert system' and 'Legal knowledge system' have been avoided in this paper.

### 5. Future developments

At the Workshop for Computer Science and Law, jurimetrics research is done to increase empirical knowledge in the field of law. It is hoped that with the results of this research it will be possible to overcome some of the problems that exist in building legal knowledge systems. One research project will be highlighted here. It concerns the assessment of the syntactical characteristics of legal texts.

In 1989, the Workshop started to gather legal documents in electronic (i.e. computer readable) form. With the cooperation of a Dutch publisher, the contents of a legal databank containing every piece of statute law that was in effect in 1989 could be used. This databank (about 300 MegaBytes of text) was copied onto an optical WORM (Write Once, Read Many times) disk. An extended selection of Dutch case law (from 1965 to 1989) was readily available on a CD-ROM disk. This databank also contained about 300 MegaBytes of text. On an 80386 PC, inverted files were created containing sorted lists of all the words in the two databanks. Information on the number of times a word occurred in

every document (judgement or piece of statute law) was also recorded.

The resulting lists gave an accurate description of the most important characteristics of a large number of Dutch legal documents. Not every legal document was included, but the documents that were, are considered representative. By comparing the frequency distribution of words in our lists with those of the 'ordinary Dutch written language'<sup>8</sup> we think it will be possible to describe the general formulation of Dutch legal texts, for example the kind of words lawyers often use, etc. With this information, it will become possible to discern legal documents (and in the end perhaps even legal documents on a specific subject) from other documents *automatically*. Not only will this present a number of new possibilities for the automatic retrieval of legal documents, but it is expected that a facility which enables a user to find out what a certain legal document is about by computer will lead to many new research projects in which empirical knowledge is gathered, for example about the way legal rules work, and how legal decisions are made. This empirical knowledge in turn might lead to new application programmes for legal purposes. For these new systems, the name 'legal knowledge system' would be more appropriate than at present.

## 6. Conclusion

The development of the JURICAS shell has made it possible for lawyers and other experts to build their own computer advice system. Such a system has been constructed by a Dutch social security service. Due to the fact that empirical knowledge about law is scarce, it is almost impossible to build legal knowledge systems; an alternative is formed by legal computer advice systems. Expectations are that jurimetrics research, for example research into the syntactical characteristics of legal texts, will eventually lead to a better understanding of the way legal rules work. The construction of computer programmes containing empirical legal knowledge might then become possible.

## 7. Notes

1. See [De Mulder 82]. For a summary of the experiment, see [De Mulder 83] and [De Mulder 84a].
2. The way JURICAS 'steps through' the decision process resembles in some respects the way the CAPS system operates. For a description of this system, see for example [Lauritsen 89].
3. An example is given in [Kerkmeester 88]. Knowledge based systems often contain an experts

conception of a legal issue, rather than a computerized version of a law. See for example [Susskind 89], p. 598.

4. This computer-advice system was developed by the social security service 'Haarlemmermeer' in Hoofddorp, The Netherlands.
5. For example the Tessec-system of the Technical University of Twente, The Netherlands. See page 28 and further of [Nieuwenhuis 89].
6. See [De Mulder 89] and [Noortwijk 90].
7. See page 40 and further of [Popper 65].
8. The institute for Dutch Lexicology (Leiden, The Netherlands) has done extensive research into characteristics of all kinds of Dutch texts, and can provide a representative list that can be used for comparisons.

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