# AI & Criminal Law: Past, Present & Future

Arno R. Lodder, Anja Oskamp and Marius J.A. Duker

*Vrije Universiteit - Computer/Law Institute*
*{lodder, a.oskamp, m.j.a.duker}@rechten.vu.nl*
*http://www.rechten.vu.nl/~lodder*

**Abstract**

Next to the three parties of the criminal process traditionally considered, viz. the judge, the prosecutor and the suspect, there is fourth party: the victim. We describe a project we carried out for Dutch Victim Support Organization (DVSO). The project deals with the type of tool that should be developed to assist the volunteers of the DVSO to set the amount of damages to be asked from the suspect.

Besides reporting on the DVSO-project, we discuss relevant criminal law systems that are grouped by the actual user of the system (judge, prosecutor, suspect). We also address future lines of research: the development of a theoretical framework for sentencing and the incorporation of knowledge management into AI & (criminal) Law research

## 1 Introduction

Criminal law is probably the part of law where argumentation is most important. Decisions in this field may affect the freedom of people, and human beings regard their freedom as one of the most precious things. Consequently, if a public offender decides to prosecute a suspect, he has to have good reasons for doing so. In the next phase, the judge who finds a suspect guilty must firmly ground his decision. Many computer systems have been developed to imitate or support the judge, and few systems to imitate or support the prosecutor. Systems to support the suspect have only sparsely been considered, e.g., the JURICAS-system on preventive custody (Van de Velde, 1986).

Next to the three parties in the criminal process mentioned above, viz. the judge, the prosecutor and the suspect, there is fourth party that has been largely neglected in the past: the victim. Nowadays attention is paid to the support of victims, in the Netherlands particularly by the Victim Support Organization (DVSO). It was this organization that came to the Computer/Law Institute and asked to research the development of a tool[1] to assist their volunteers to set the amount of damages to be asked from the suspect. The DVSO-project fits in with particularly two strands of research performed at the Computer/Law Institute. One is a Ph.D.-project, performed by the third author, on the possibility to model sentencing in such a way that it can be implemented as a knowledge-based system. The other is on the use of

1 At the moment we are writing this (September 1998) we are not yet certain, but probably we only guide the IT-company that implements the system and will not do it ourselves. We hope we can inform you on this topic at the conference (December 1998).

knowledge management in the legal field in order to optimize Information Technology support for lawyers (e.g., A. Oskamp[2] 1998).

In this paper we report on the DVSO-project. First, we evaluate existing decision support systems in the field of criminal law. The systems are categorized by the party in the criminal process they support, since their roles are different. The prosecutor follows prosecuting policies, and demands a reasonable penalty. Put into extreme: the highest possible penalty. The suspect wants to adduce arguments that make his punishment as low as possible. In between these two stands the judge, who weighs the interests of the involved parties (also including community interests). Justification of his verdict is crucial.

After the evaluation of the systems, we will focus on the fourth party in the criminal process, the victim, and explain why we advised the DVSO to use a database rather than a knowledge-based system or a computerized checklist. Finally, we discuss research that has to be conducted in the forthcoming years: develop a theoretical framework for sentencing and integration of existing systems by using knowledge management techniques (e.g., storage of expertise, use of intranets to spread information, streamline company processes).

## 2 AI & Criminal Law

In this section we will briefly discuss Criminal Law systems for judges as well as for the prosecution authority. The former systems are destined to support the final decision in the criminal process, the latter to support the translation of prosecuting policy into demanding a sentence from the judge in specific cases. The other two parties in the criminal process, the suspect and the victim, lack decision power and instead anticipate on the decisions by the former two, in particular by the judge. Therefore, both the victim and the suspect would be interested in using the systems developed for either the judge or the prosecutor. We will return to this issue later, when we address the future lines of research.

In the discussion below we will focus especially on sentencing support systems that were developed in the Netherlands.[3]

### *2.1 The perspective of the judge*

In the last two decades computer programs to support the sentencing decision process have been developed in different countries. The systems can be divided into rule-based systems,[4] statistical systems[5] and case-based systems.[6] Case-based systems tend to be most popular nowadays, probably because they provide the judge with interesting information about similar cases (penalties, grounds), while his discretionary sentencing-competence is respected. Note, however, that these case-based systems normally do not

2 Since in this paper reference is made to both Anja Oskamp and Eduard Oskamp we refer to them using their initial letters.

3 Note that we do not pretend to be exhaustive. For a more detailed discussion see Tata, Wilson & Hutton (1996).

4 For instance, the Dutch SENPRO system (De Mulder *et al.* 1982), further developed into the JURICAS-computer advice system (Hulsman & De Mulder 1986); the American ASSYST (Simon & Gaes 1989); and CASE, designed by Bainbridge (1991).

5 For instance, the system by Doob & Park (1987) and the LIST-system (Hogarth 1988).

6 For instance, JUDGE (Bain 1986) and the system by Schild (1995).

reason (so they are not case-based reasoning systems), but merely present the information.

For different reasons, these systems have not been used successfully in the sentencing practice. The costs of managing the systems' knowledge are very high. Another important obstacle at present is the relative lack of interest of judges. This may be caused by the fact that these systems do not yet present a tool that judges really need and/or want to use. But things are changing. Currently, systems have been realized in New South Wales (Australia), Scotland and the Netherlands. These systems are (partly) statistical or case-based and seem to be more successful, probably because the support is accurate, the judges begin to become more interested, and the implementation is well organized.

The SIS (Sentencing Information System) of New South Wales, Australia (Potas 1991) has both a statistical function and a multiple information retrieval function.[7] Inspired by the Australian SIS the University of Strathclyde (Scotland) started a study on the feasibility of a Scottish Sentencing Information System in 1993 (Hutton *et al.* 1996). An important difference with the Australian system is the absence of a structured administration.[8]

*The Netherlands: NOSTRA and IVS*

Recently NOSTRA has been introduced in four criminal courts in the three Northern provinces of the Netherlands, amongst others in the one hosting JURIX '98, Groningen. An interesting fact is that initially the progress in the project was hampered by the existing differences in sentencing practice (Otte 1998). NOSTRA bears many similarities to the Scottish SIS. Eleven offence categories have been distinguished. After selecting a small amount of case characteristics, the system offers statistical information about similar cases. All cases contain a brief summary and relevant information that is entered by the judges themselves while working on the case. The system is updated every night through the network (the computers are linked to each other): all four courts send each other new (administered) cases. Fortunately, it does not take much time to enter cases, because of the small number of case characteristics and variables. The system is presently very user-friendly. Introducing more variables could improve[9] the main resource of structuring sentencing in practice: justification of sentencing. Exactly that has been the essence of another system: IVS.

The IVS-system (E.W. Oskamp[10] 1998) is presented as a case-based reasoning system[11] that supports the judge in finding previous cases. The relative lack of information about similar cases is considered to be the main reason for inconsistency in sentencing. After interviewing judges a number of input variables were established in five groups of offences (e.g., traffic offences, drug

7 The SIS is administered by the Judicial Commission of New South Wales, also responsible for education and training, and for monitoring judicial conduct. A steady increase of using the SIS has been reported (cf. Tata 1997).

8 A prototype 'Appeal Courts Judgement Database' containing all judgements from the Appeal Court related to sentencing incorporated in the SIS is nearly completed (Tata Wilson & Hutton 1996; Tata 1997).

9 Notably, introducing more variables puts more stress on maintenance.

10 See footnote 2.

11 We would rather call it an advanced retrieval system that may form the basis of case-based reasoning. In its present form the system itself does not reason with the cases, but merely presents them to the user.

offences) that were chosen in advance. These variables – divided into objective 'facts' and subjective 'factors'– are used to search for similar cases.

E.W. Oskamp defines three purposes for using the IVS: 1. a general deepening of understanding or study; 2. as a preparation for the trial, and; 3. in the decision process about the sanction to be imposed. For the time being the system cannot be used in practice. The number of variables is simply too high. Filling in the forms (during the deliberation in chamber) takes too much time. E.W. Oskamp has emphasized that alterations in the organization of the judicial power are necessary in order to provide it with the capacity to implement a system like the IVS, for example by using the internet. The Courts of Appeal have agreed to ameliorate their motivation and start a project using the system for cases where sentences of more than four years have been imposed.[12] The main result of this project will hopefully be a clarification of sentencing habits and principles.

### *2.2 The perspective of the prosecutor*

The public prosecution has a fully fledged rule-based system at its disposal containing the guidelines of 80 percent of the commune offences (Openbaar Ministerie 1998). The system supports the prosecutor by advising what sentence should be claimed according to the guidelines. The prosecutor can ask the system to show the relevant guideline and the amount of 'sentence points' for several influencing variables.[13] Although the system itself does not offer the exact reasons for an advice (i.e. the link between amount of points and the specific (type of) sentence), the prosecutor is obliged to indicate his reasons for not following the advice.

### *2.3 The perspective of the suspect and the victim*

Different IT tools are needed for judges and public prosecutors. Their task is different. To put it rather in black and white: while the public prosecutor intends to put forward a sentence claim that is in accordance with the severity of the offence, it is the task of the judge to find a balance in the severity of the case and the person of the suspect. This means that it is easier to provide the public prosecutor with guidelines than to do the same for the judge. The position of the suspect and victim is again different.

To our knowledge, only one system (Van de Velde 1986) has been developed to support the suspect. But as was said already, suspects (or their attorneys) would be very interested in using any of the above discussed systems. However, they are not yet available for the general public.

We do not know of any system that has been developed to support the victim. In the next section we present our DVSO-project as a case study exploring the role of the victim.

12 First of all the project necessitates the filling of the database with cases of 1997 in order to provide similar cases to the courts.

13 For example, a) principle factors, having the same aggravating influence independent from the principle offence, b) offence-specific factors, having a specific aggravating influence on specific offences, c) legal factors, i.e. complicity, making one to commit an offence, incitement and attempt and d) recidivistic behavior.

# 3 Dutch victim support organization – a case study

## *3.1 Introduction*

In the Netherlands, the Victim Support Organization helps victims of crimes in different ways: they provide information and give advice, they support emotionally, they support in filling in forms, they write letters and they support in claiming damages. The Dutch Victim Support Organization (DVSO) has main offices in each of the 25 police regions of the Netherlands. Beside these main offices, a region can have one or more sub-offices (55 nationwide). The organization depends on numerous volunteers who provide the actual support. The number of professionals employed by the organization is limited. The background of the volunteers is very different. Some of them have had some kind of legal training; others have no legal background at all. The turnover of volunteers is substantial: about 25 percent of the volunteers leaves the organization within the year.

Only a year ago the DVSO only had stand-alone computers. At this moment a technical infrastructure has been realized. The main offices and sub-offices are connected by 80 ISDN lines to the main server in Utrecht. Quarterly each main office sends statistical information of passed cases that were treated in its region to the central office in Utrecht.

The Computer/Law Institute advised the DVSO about the way volunteers can be assisted by a tool in order to set the amount of damages to be asked from the suspect. This amount partly consists of material damages and partly of immaterial damages. In the Netherlands the amount of immaterial damages sustained is usually rather low. The victim support organization handles claims that do not exceed Dfl. 5000. Such amounts of money are related to less serious offences, although the impact on the victim can be substantial. Material damages are rather simple to calculate; calculation of immaterial damages is more complicated.

The requirements for the support tool can be formulated as follows. The system should be user friendly. It should require a low level of previous knowledge both from an IT perspective and from a legal perspective. In addition the system should be easy to fill and maintain, since these activities will mainly be carried out by the various offices themselves. The support to be given is rather basic. Unlike most other sentencing information systems, this system supports laymen.

In the next two sections we will explain why we did not choose for either a knowledge-based systems or a computerized checklists but for a database instead, and describe the properties of the database to be developed.

## *3.2 Knowledge-based systems & computerized checklists*

Being members of the Dutch foundation of knowledge-based systems, obviously the possibility of using knowledge-based systems first sprang to our mind. However, for several reasons we chose not to do so.

First, the danger exists that the users of the knowledge-based system accept the solutions offered without question. In a paper with the suggestive title 'How to fool a lawyer?' (see Dijkstra 1998, chapter 5), it appeared that even lawyers cannot be trusted on this point. Since in our case usually the users of the system will not be trained lawyers, but rather paralegals, the risk that the advice of the system is adopted too easily is probably even higher.

Second, the costs of development and maintenance would be high. Not only for the usual reasons, but also because the applicable, interdisciplinary legal domain is still in its infancy. On the one hand, the acknowledgement of claims based on immaterial damages is recognized seriously only for some years. Although we do not hope that the development on this point is going to lead to the 'US-situation', there is a tendency in that direction. On the other hand, before the mid 1990s civil claims of victims in criminal cases were not allowed if they exceeded Dfl. 1500. Although nowadays the sky is the limit theoretically, the criminal judge may abstain from deciding if the height of the damages is not easy to determine. Or, in other words, when the case is a hard one. Many years of exploring this subject in the field of AI & Law showed[14] (e.g.: Gardner 1987; Hage, Leenes & Lodder 1994) that it is not easy to decide whether a case is a hard one or not, let alone to solve a hard case.

Finally, if there are cases that the system cannot solve, the users will be left with a feeling of dissatisfaction. And, because of law's open nature (cf. e.g., Lodder 1998, p. 14f.) irresolvable cases will occur. Hence, it is impossible to foresee all possible cases. A closely related problem has to do with that knowledge-based systems reason with rules. Because of the general nature of rules (and exceptions as well), it is sometimes impossible to take into account all peculiarities of a case. As a consequence, the outcome of the system can be wrong in a specific case. This is already difficult to recognize for lawyers, let alone for the layman that will be the users of this system.

Systems that are related to knowledge-based systems are so-called computerized checklists. For instance, the company MRE (see A. Oskamp & Tragter 1997) uses this technique that stems from the renown JURICAS-programs (Van Noortwijk *et al.* 1991). The user is asked a series of questions that – depending on the given answers – result in a solution. These systems are based on decision trees. The difference between knowledge-based systems and computerized checklists is that in the former separate knowledge bases contain the reasoning information, and that in the latter the reasoning knowledge is interwoven with the questions asked to the user. This makes maintenance even harder than it is for knowledge-based systems. An advantage of this interwoveness of questions asked to the user and the reasoning knowledge is that the user will learn the domain while using the system. In case of a knowledge-based system an explanation utility fulfills a similar role. However, even apart from the fact that the user will not always consult the explanation, he is not actively involved when reading it, and therefore it will take him considerably more time to pick up the domain knowledge. Note, however, that volunteers are not staying for a long period, so the pay-off could never be really big anyway.

Since the above described disadvantages of knowledge-based systems apply to checklists as well, we did not choose for a system containing only a computerized checklist. However, the database proposed below will contain one or more checklists that support the user if he is filling in the form.

14 The doctoral dissertation by Ronald E. Leenes, that will probably appear at the beginning of 1999, also deals with hard cases in law and legal informatics (in Dutch, with a summary in English).

### 3.3 Properties of the database to be developed

We have chosen to use a database containing previous cases to support the volunteers of DVSO. Such a database supports users in a way that fits in with their working method. As far as immaterial damages are concerned, DVSO explained their working method as follows. If they know similar cases from the past, they try to apply this knowledge to the current case. If they do not have an idea what amount of money should be asked for, or if they doubt whether the amount they want to ask is appropriate, they consult a senior, who on her turn either recalls similar cases from the past, or searches for similar cases in the 'Smartengeld-gids'[15].

A hot topic nowadays is knowledge management (see, e.g., Susskind 1996; Wiig 1997; Weggeman 1997; Davenport & Prusak 1997; A. Oskamp 1998). From an IT perspective the aim is to develop methods to organize knowledge and information in such a way that it becomes available to all employees who need it. The storage and accessibility of this 'know-how' is meant for both current and future employees. Knowledge management is especially useful for organizations like the DVSO with a high turnover of employees while at the same time the employees need rather specific knowledge to perform their task. Therefore, storage and accessibility of past cases is especially important for future employees. In order to realize the accessibility of the database, we defined a number of fields to search relevant cases.

The criminal judge decides whether the suspect has the duty to repair the damages that are claimed by the victim. Because the legal domain is a mixture of criminal law and civil law, the proposed fields of the database derive from both civil and criminal law. The main fields are the criminal fact underlying the civil claim, and the damage type. For the filling of the database we can exploit the current data set that is used for statistical information. The categorization of criminal offences is already included in these data. At this moment the amount of money asked for is not included, and it should be added. A short case description completes the necessary information.

Neither the addition of the categorization of damages types (diminished joy of living because of pain, grief, suffering, etc; bodily harm; loss of income, etc.), nor the short case description is likely to cause any problems. Although the estimation of the amount of damages by the volunteers is of interest, it is especially the verdict that provides useful information. Therefore, we demand that the verdict is entered. Since this is not a routine already, the employees will get an additional task. It is not sure whether they are willing to do so, but cooperation on this point is crucial. The project probably becomes a failure if the information of the verdict keeps lacking.

In order to facilitate the input of data, checklists can be used. The searching of the database can be facilitated by thesauri. We want to include 5000 cases at the most, or cases not older than 5 years. If the number of cases exceeds 5000, or if a case is over 5 years old, the particular case is removed (either the over 5 years old case or the oldest contained in the 5000+ set). In using this policy, we prevent an outdated set of data without much maintenance being necessary.

When the volunteers of the DVSO consult the database they will enter the facts of the case at hand with the help of checklists (e.g., to decide the crime category or the severity of the injuries). That will result in a specific

15 This is a guide containing a number of civil law verdicts concerning immaterial damages.

number of retrieved cases with the same criteria. With the help of these cases the volunteers can put forward their claim of immaterial damages.

## 4 Future lines of research

In this section we discuss two directions of future research we will carry out in the next couple of years: developing a theoretical framework to structure the sentencing process and exploring knowledge management in the legal field.

From a sentencing-consistency point of view retrieving similar cases is a very practical solution to eliminate differences in sentencing. However, judges are still reserved towards using these systems. A way to convince more effectively the judges with the potentials of IT to support their work is to base the support on fundamental research of the sentencing decision process.[16] Although legal literature is loaded with studies and opinions about sentencing, a well-defined structure of the decision process is still lacking.[17] Defining a structure might improve decision-making, as well as clarify reasons for inconsistency in sentencing. Moreover, theories about the decision process could help in defining demands for AI tools in sentencing and provide a tool for the analysis of theoretical problems like cumulative verdicts, recidivism, suspended sentences, sentencing-type differentiation and combinations of penalties. Extended research is necessary both taking into account theoretical aspects of criminal law and the opportunities of computerization. An interesting angle would be to develop a model combining purposes of punishment with sentencing principles that are based upon, for instance, sentencing guidelines, agreements between judges and sentencing-motivation databases.

This research would also offer a solid background for developing tools for other parties in the sentencing procedure wishing to anticipate the decision of the judge. The public prosecutor could use these tools first to translate his policy into specific demands for a sentence. Subsequently he will try to convince the judge to take over the demand by concentrating on aspects the judge usually takes into account. The defense wants the lowest penalty and therefore will try to influence the judge on aspects that might reduce the penalty. But also groups such as the DVSO wish to have their civil claim granted in the criminal procedure. Fundamental research of the sentencing process can make clear in the future how the civil claim can be put forward more effectively in the context of the criminal process. It is groups like DVSO that can very well be supported by IT-tools, such as decision support systems, and often keep an open mind towards support.

The domain used by the parties in the criminal process is the same, but the information and knowledge that is needed at certain moments in the procedure may differ depending on the interests of the parties. Reuse of represented knowledge, a subject that keeps coming up in publications on AI & Law may get a real meaning.[18] Is it possible to use the same represented knowledge to support different parties with different perspectives on the

16 As a purely descriptive model of the sentencing process is impossible, the resulting model will be partially normative.

17 A certain kind of structure can be found in a psychological theory on the reasoning of judges in general and their justification of sentences (Crombag *et al.* 1974).

18 The strong branch of ontology research in AI & Law might be of help here (e.g. Valente 1995; Visser & Bench-Capon 1996; Van Kralingen 1997)

same subject? Do they need the same tools? Applying knowledge management techniques will be necessary (e.g., storage of expertise, use of intranets to spread information, streamline company processes). At the same time those techniques will offer great help, especially in defining the needs of the various parties. Integration of various IT tools will be indispensable.

What has always been an important issue is maintenance. It has become clear that a good organization is indispensable in relation to the maintenance of IT-systems. In order to provide such an organization adequate knowledge management is necessary.

The knowledge management perspective offers many possibilities for research in AI & Law. Paying attention to the needs of lawyers in practice and keeping an open mind for new developments both in IT and in other disciplines will help researchers in legal informatics to apply their knowledge and skills to build practical applications. Those, in their turn, will offer new challenges for research. For that purpose it is necessary that the gap between theory and practice will be narrowed (cf. Oskamp, Tragter & Groendijk 1995; Verheij, Hage & Lodder 1997).

## 5 Final remarks

Nowadays lawyers become steadily more interested in the use of Information Technology. This interest can even increase if the support of IT-tools is in character with their needs. These needs are different for each party playing its role, although part of the tools and the knowledge they contain are reusable.

Since not all employees of a legal company know what the company as a whole knows, or what an individual employee knows, managing knowledge is an important task within the legal discipline. Moreover, the turnover of employees will cause knowledge to disappear when an employee leaves, if no sufficient measures are taken. It goes without saying that Information Technology can supply ample tools for knowledge management (see Wielinga, Sandberg & Schreiber 1997), and as far as legal knowledge is concerned, the group of 'AI & Lawyers' play a crucial role.

A final word is directed towards the members of the JURIX foundation, and since we belong to this group, we do also speak to ourselves. Our annual international conferences are relatively well attended. Although the Dutch AI & Law community is diminishing, it is still an enthusiastic and inspiring group. We do, however, believe that our scope should be broadened. As it is now, JURIX is not easy to access from outside the AI & Law community, and that is a pity. Most of us probably never heard of interesting research of for example Dijkstra (1998) and Van der Bijl (1998). It will be easy to give other examples. If we do want to establish our position, and possibly grow, we should embrace all research on IT tools in the legal field, no matter if it is performed at companies or at departments that are not JURIX members.[19] Undeniably the third millennium will be full of Information Technology applied to the legal field. We have the ability to make this millennium a good one for AI & Law.

19 This was also argued by Abdul Paliwala in his invited lecture at the tenth JURIX-conference.

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