AN INTELLECTUAL CELEBRATION: 10 YEARS OF JURIX CONFERENCES

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Abstract

This paper reviews the last nine JURIX conferences. It applauds the overall effort but also suggests some directions for future development based largely on papers presented. It suggests in particular:

The breadth of research has been commendable, but there is a need to move towards greater integration of systems and migration to internet based systems.

Tools are likely to be improved in the next generation including the internet. Legal Knowledge Based Systems (LKBS) research may need to abandon fine boundaries between AI and other applications tools.

The commendable diversity of approaches to legal knowledge representation overlays concerns about the nature of law and its translation in LKBS.

These issues of knowledge representation, theory and cost and organisation of production can be best address by a return to a cybernetic systems theory as a basis of analysis of relationships involved, and an undestanding of culture change.

Introduction

I am an interloper. This is my first JURIX Conference. I cannot claim to being a fully fledged member of the AI and Law Community. I have taught undergraduate students, supervised postgraduates, examined Ph.D.'s, published some of your work in our journals, welcomed quite a few of you to our BILETA conferences, dabbled in expert systems and encouraged students to develop them, and had some exciting conversations on the subject. But this is not equivalent to your dedication to the subject. I suspect that I was given the honour to present this paper, precisely because I am an outsider, but with sufficient knowledge of the inside of your autopoietic community to make a noise whose reverberations might be felt by you.

So I am not quite a member of your club. As the great Marx (not Karl but Groucho) used to say, I would not want to join any club that would have me. But at this point, I reject Marxism, and apply for membership as a novice. My credentials are that I have read the conference proceedings, and have been inspired by them. It is in this sense of a new member that I use the expression 'we' instead of you. You will appreciate that when I am being critical, it will be a matter of self-criticism - my brief is to indicate where we have been and how we can go forward.

Let us therefore begin by congratulating the Netherlands Government and the academic community on its ambitious programme, I believe of 8 million guilders, on "Information Technology and Law", which has resulted in one of the strongest IT and Law communities, and especially AI and Law communities, anywhere on the globe. This initial funding has also resulted in successes in attracting funds from various government departments especially the Department of Social Security, Ministry of Justice as well as the EU.

More specifically, I would like to congratulate the Foundation for Legal Knowledge Systems for providing what the editors of the 1991 Conference called "a critical and supportive forum" through the conference and other activities to sustain the knowledge based systems community over the last ten years. As a Family lawyer, I know that to be undivorced for 10 years for any married couple let alone an organisation is, these days, quite an achievement. Those AI and Law enthusiasts, who are among us today, who made the original decision to get together need special congratulations. Of particular merit was the foresight to be global, rather than a Dutch pond; to encourage a truly international conference, even if with a strong Netherlands flavour, to proceed and publish in English. This has enabled mutual learning, but more especially led to enhanced prestige for the Conference and for Netherlands research.

Over the years, the conference themes have been broad, including technical concerns, AI theory, technical issues such as modelling, legal theory, practical concerns with validation and use, specific areas such as telecommunications and legislative drafting and concern with the overall direction of research and development. Even when the papers have been about wider theoretical issues, they have normally been informed by and based on research in applications development - whether of a fundamental nature or of development of commercial applications.

List of topics of JURIX Conferences

97 – The 10th Conference

96 - Foundations of legal knowledge systems

95 - Telecommunications and AI and Law

94 - The relation with legal theory

93 - Intelligent tools for drafting legislation. Computer supported tools for comparison of law.

92 - Information technology and the law

91 - Model based legal reasoning

90 - Aims for research and development

89 - An overview of criteria for validation and practical use

88 - Paradigms in legal informatics

A related publication was:

1994 - Information technology and law in the Netherlands: Research and research groups

Another matter for congratulation is the willingness to wriggle, adapt and develop in the fast moving stream of information technology. The JURIX conferences began as the era of extravagant claims for AI in Law research was coming to an end, and, from retrospection, lessons were being learnt. Thus the 1991 Conference editors were already celebrating their globalism and the emphasis on technical papers (Breuker et al JURIX 91). By 1996 the change of emphasis could be clearly observed:

> In the late eighties a substantial amount of AI and Law research focused on developing useful applications for the legal profession. Though some applications actually contributed towards alleviating the load of legal professionals, most of the applications developed did not meet the high expectations of researchers and users. Nevertheless, research continued. However, the overly optimistic points of departure on which a great deal of research was based have been subject to revision.
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> As a direct consequence, in the early nineties we see a shift in the research effort. On the one hand, an increasing number of researchers went "back to the basics" i.e. to the real foundations of LKBS. This shift can be illustrated by the growing attention spent on ontologies, logics, model-driven knowledge acquisition etc. On the other hand, the original aim of developing applications that could actually perform part of the tasks of legal professionals, has changed to developing applications that can support legal professionals in the performance of their tasks. Perhaps this last development is best marked by the disappearance of the term 'expert system'(van Kralingen et al 1996).

This statement combines a pessimistic outlook on earlier broad claims with a mature approach to further development. This attitude is not new, because as early as 1990 de Widt et al had suggested that there was a need to abandon attempts to create complete LKBS in favour of more specific research goals.

This adaptation is common sense. Nevertheless, it may be necessary to consider whether some of the drawbacks of small research teams can be ameliorated by greater coordination, and secondly question whether the adaptation has gone far enough, and whether we should be looking for new dimensions of change. Many of these directions are already signalled in existing work of JURIX delegates, but there needs to be a new conviction about expanding the horizons.

I suggest the following

> The breadth of research has been commendable, but there is a need to move towards greater integration of systems. Internet based systems are by their nature integrating and provide a great avenue for a transformation of legal practice.
>
> A wide variety of research tools has been used, and it is expected that newer and more powerful tools will be developed in the next generation. For example, neural networks may cease to be toy systems. More interestingly, more sophisticated AI tools will become available on the internet. In an era of greater integration between IT tools, LKBS research may need to abandon fine boundaries between AI and other applications tools.

The diversity of approaches to the representation of legal knowledge is also commendable, but underlying the disputes on isomorphism lie greater concerns about the nature of law and its translation within the information technology context.

These issues can be best address by a return to a cybernetic systems theory as a basis for analysis of the relationship between the different persons, tools, processes and cultures involved in law and information technology. In particular, the relationship between the producers and the users needs to be reconceptualised through micro-analysis and anthropological observation. In addition, a new comparative understanding of micro- elements of tasks, costs and benefits of IT based work compared with traditional legal work may yield surprising results about the new dimensions of development.

An awareness that traditional legal theories were not meant for the information age. Theorisation about law needs to be informed by a range of new theoretical approaches which approach legal systems as cultural systems.

Let me examine each of these:

Areas of applications development

The areas of applications development have varied between fundamental research and commercial applications. In relation to the latter, for example, the JURICAS work has led to marketing of expert systems as well as the development shell. What made for the commercial exploitability of JURICAS? The answer may be, as Van Noortwijk et al (JURIX 90) suggest, that the system was developed to fit user needs, skills and environment and in particular that it was put together by the experts themselves - employees of the Social Services where the system was to be used.

It is an easy mistake to be pessimistic about fundamental research. By its very nature, research which explores deep issues about the representation or modelling of legal knowledge or exploration of the nature of legal language will not provide short term commercial success. Yet, fundamental research often has indirect impact on those developing practical systems by stimulating consciousness of the possibilities. The sophisticated tools which are now available for information retrieval and navigation, including hypertext, as well as legal practice and computer based learning are not strictly AI tools, but they have been informed by developments in AI work (Wood JURIX 89) . For example, Intelligent Tutoring Systems have yet to prove themselves in the real world. The Law Courseware Consortium did not consider AI-CAL tools in the development of *Iolis* courseware. Nevertheless, we obtained many stimulating insights from the notion of different models of student and how this could be practically achieved using hypertext loops in our much more pragmatic software.

The rich variety of types of application includes systems for the application of social security legislation such as TESSEC and JURICAS, systems for supporting the drafting of legislation such as TRACS (den Haan, JURIX 92),a simulation model for the asylum process in which legislation, practical and process issues are used to develop a model (Grutters JURIX 95). The LEDA project approaches legislative

support from a very different perspective. It is a semi-intelligent system for providing guidelines to the draftsman or woman (Voermans and Verharen JURIX 93). Most system development provides an opportunity to explore fundamental issues about legal knowledge representation, and I have little doubt that JURIX conferences have stimulated this.

Case based reasoning systems are also represented, but perhaps at not such a strong level as in North American conferences. In the Civil Law European papers, there is still a hierarchy of relationship between legislation as the primary source and cases as a secondary one. It is therefore not surprising that case based approaches would be relevant in situations where the only basis of analysis is likely to be the statistical information provided by cases, whether in sentencing or in the calculation of 'smart money' damages. This is apparent from Groendijk and Tragter's paper (JURIX 95) which compares regulation formulae, statistical and neural network determination in 'smart money' situations. The LEIDRAAD project (Quast and de Widt, JURIX 89) also uses cases without 'case based reasoning', but assigns weight factors to them which are fine tuned by testing, rather as in a neural network. The Australian SPLIT UP project attempts to integrate rule bases with neural networks.

JURIX conferences have also involved a number of different projects in information retrieval. In these, there has been a persistent problem of the limitations of string based approaches. Wildemast and de Mulder (JURIX 92) describe a conceptual information retrieval project designed to assist the user define her own concepts. Van Noortwijk and De Mulder (JURIX 96) describe innovative work on word use in legal texts which has both theoretical and long term practical significance. The SALOMON project (JURIX 96) from Leuven is exploring the exciting prospect of providing automated abstracts for legal decisions - a development of enormous significance to legal publishing.

The breadth of research has been commendable, but there may be a need to move towards greater integration of systems and approaches. This is described below under techniques.

Techniques

It is obvious from the above description of the variety of projects that JURIX conferences continue to represent a pluralism in technique. There is a significant use of PROLOG or PROLOG type systems, yet shells such as JURICAS which have specifically been developed for law have also made their mark. At the same time, FRAMES, case based models, simulation models, decision tables, hypertext and neural networks all feature in a diverse environment.

A wide variety of research tools has been used, and it is expected that newer and more powerful tools will be developed in the next generation. For example, neural networks may cease to be toy systems.

Furthermore, there is a growing attempt at mix and match integration. This is of two types. On the one hand, a number of different technical approaches are integrated to

hypertext information systems. More innovatively, they are also being integrated with neural networks. A different approach to integration is that represented by integration of a variety of applications. In this context the LACA Project (Heesen et al JURIX 95) provides an interesting perspective for design of systems for intercommunication between different LKBS.

Guidotti and Turchi (JURIX 95) describe integration at a different level, for the development of LKBS to provide effective information retrieval across networks.

Individual researchers on relatively small budgets can only carry out highly specialised tasks, but users increasingly demand integrated solutions which enable them to carry out a variety of tasks (see eg Paliwala et al 1997) rather than a separate existence of AI based decision and legal support, document assembly, information retrieval etc. The success of the internet and especially the web has been precisely its ability to assist the production and presentation of an immense network of systems and tasks in an integrated and ergonomic way to the user (Leenes and Svensson JURIX 95). More sophisticated AI tools will become available on the internet. In an era of greater integration between IT tools, LKBS research may need to abandon fine boundaries between AI and other applications tools and develop systems which meet the user demand for integrated systems.

More significantly, the question of whether research should be organised in small groups or large teams and the extent of coordination needs to be addressed. Small groups can survive reasonably well in standardised environments, but otherwise the overheads of systems development may be too great to move beyond experimentation. And yet, when we move beyond experimentation, the lack of consensus in approach to legal knowledge representation may be a relative hindrance.

Representation of Legal Knowledge

I have already suggested that the decade of the JURIX conferences represents a maturer phase of AI in Law development than the first phase which was marked by extravagant claims and equally extravagant criticisms. Nobody suggests anymore that formalisation of statute law will lead to systems capable of judicial decision making. However, these debates have left their mark on the AI & Law community. As Bench-Capon and Visser (JURIX 1996) suggest:

> Much work has therefore concentrated on understanding the limitations and developing systems which can mitigate the limitations. The overall trend has been away from seeing the process as one of encoding heuristics derived from an expert, towards modeling the domain on which the expertise operates.

Bench-Capon and Visser (JURIX 96) suggest that ontologies would make conceptualisation of the legal domain explicit, thus enabling comparisons of different formalisations, reusability and improvement of communication between different LKBS. However, such ontologies ameliorate problems of LKBS but do not solve them, as the issues are ultimately about what is the most appropriate formalisation of legal knowledge.

An aspect of the debate seems to be the assertion that encoding of heuristics derived from experts as in the early systems of Capper and Susskind and McCarty must be abandoned in favour of systems which can be mechanically constructed from the primary texts themselves. This is curious partly for the reason that whatever the ultimate result of the research, there are no known successful systems which have been built using these techniques. In fact, the opposite seems to be true. Capper and Susskind's system, however basic and difficult to maintain it may have been, was nevertheless a working system, if unfortunately in an esoteric area of law. McCarty's system also was pretty robust. More interestingly, the JURICAS systems have been developed by giving those closest to the coal-face, the using department, the largest say in the development process (van Noortwijk et al JURIX 1990):

> It became clear that the ones 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) authors base their work on practical knowledge.

Even those who are concerned to develop ontological systems such as van Kralingen and others, accept that while isomorphism may have advantages, it does "not do justice to the richness of the legal domain" and suggest a need for intermediate language and heuristic procedures for the translation of norm formulations. The issue is whether such language and procedures can be effectively translated into ontological models. There is an underlying debate about the nature of law and its translation to an information technology context.

A Cybernetic Approach

As suggested earlier, we need to return to cybernetic theory as a basis for analysis of the relationship between law and information technology in project development. Stated simply, cybernetic theory suggests that human beings and machines have to be analysed as equal components of systems within an environment in order to make sense of the system (Wiener 1948, Van de Vijver, G. ed. 1992, de Landa 1991, Deleuze and Guattari 1994). Any change in any component affects the system and the environment as a whole. Therefore, changes require micro-observation of relationships between various components in the system. In my view while AI and Law development has given considerable attention to concepts such as the domain, the domain expert and the knowledge engineer, for some reason, there has been a tendency to succumb to the temptation of seeing the key relationships in AI in Law as being between the power of the primary legal texts, knowledge engineering software and the knowledge engineer. The domain expert is subordinated as the identifier of the primary texts, even if she plays a part in subsequent development, this is subordinated to the needs of the machine. Thus it is often but not universally suggested that "Legal knowledge should be acquired primarily from legislation and case law and not from expert opinion" e.g. (Koers et al JURIX 89). This suggestion is sometimes combined with the suggestion that it is difficult to acquire that expert opinion, or alternatively, reliance on such opinion would make the law less accurate.

In spite of the current acceptance of the notion of hard cases, there is an underlying belief in a single accurate notion of the law. This of course has not gone without challenge in JURIX Conferences. However, there is a top down view of the law under which the lawyer when confronted with any problem first refers to the primary text, e.g. the civil code, then the secondary text, e.g. the regulation followed by the case precedents. Only when these are insufficiently illuminating does she look at secondary literature or ask advice from other lawyers. I find this perplexing, perhaps because I am not a civil lawyer, but most lawyers do not work like that. Research and personal experience shows that they first look up the secondary texts and only refer to the primary ones when they cant find illumination in the secondary sources. Books and periodical articles have been the tools of trade of lawyers. If they have significance in the real life of the law, surely they must find significance in artificial legal knowledge systems. Legal heuristics must also be a crucial component (Barragan JURIX 93). The task is whether such expertise can be translated into standardised reusable models.

If the lawyer as producer appears to be an undermined entity, relatively more attention has been given to the concept of the user.

Bench-Capon suggests “Effective support can only be provided by a system which can be fully integrated into the working practices of its users”.

Wildemast and de Mulder make the radical suggestion in their research in conceptual legal information retrieval (JURIX 92) of the need to develop a learning concept processor which enables the user to define his own concepts.

It is not surprising that the research which is closest to the coal-face has the most distinctive notion of the users of the system. Van Noortwijk et al (JURIX ’90) have already been cited earlier. The significance of their approach is that the potential user is clearly identified and integrated into the design of the system. The near coalescence of the knowledge engineer and the potential user can, I would argue, provide the sort of serendipity necessary for the proper development of effective systems.

De Vries et al (JURIX 1991) develop the most lucid analysis of cooperation between the user and the system. They suggest that

> Cooperation is the effectively coordinated interactive exchange of information between an LKBS and a user, in which mutual skills and knowledge are taken into account; LKBS and user are working together towards a legal advice in optimal accordance with the user’s ultimate goal.

Consequently, they propose the need to develop a distinct cooperation model which is separate from, but interacts with, the KBS.

These interesting proposals have one drawback, however. A notion of a separate cooperation model assumes an individual identity for the LKBS, with the user cooperation model being developed to deliver user-friendliness. A radically different notion of cooperation would make the user *integral* to the design of the LKBS itself. The first question for LKBS developers must be - who is/are to be the users of the system? What are their needs? How are they to be met? This involves careful analysis of the user’s environment - their office space, the ergonomics of computer use, the

way in which their systems are to be linked with the LKBS, what tools and expertise will best match their needs. The relationship between knowledge engineer, texts, domain expert and the software tools has to be designed precisely in terms of the user, be it a lawyer, an official or a lay citizen.

There is a different dimension to the analysis of these relationships, that of optimum production strategies. The desire to develop systems with the primary control of the knowledge engineer and minimal human intervention in the development is based on a desire to taylorise the law into a mass production system. In this context, the user is also a human automaton who can answer yes and no. Complex ontologies provide the hope for such taylorisation with greater involvement of the legal domain expert, but in ways which through standardisation will diminish the need for expertise. Yet, such crude taylorisation can be avoided if the questions about costs and benefits are asked in a manner which is more informed by cybernetics and issues about the relationships of power. This requires a new comparative understanding of micro- elements of tasks, costs and benefits of IT based work compared with traditional legal work. If a lawyer is paid 600 guilders per hour in providing personal legal advice, could the time not be better spent in providing that much domain expertise for an LKBS perhaps with the assistance of cheaper project assistants provided that in this way higher quality advice is provided to a greater number of clients for the same money? If as Susskind (1996) suggests that lawyers will become information providers, is not our task to leave crude knowledge engineering projects and return to a greater potential for the human intervener in the system. Developments in the internet are already suggesting a greater interactive advice role for lawyers. The web provides sources of information for the client to define her own problems on the doorstep to seeking more sophisticated advice from the lawyer over the net. The web can already be used for simple document production and flowchart based legal practice systems. If tools can be developed which lawyers can use to develop and maintain their own systems, of the kind that JURICAS suggests, then taylorisation may no longer provide the best financial or human arithmetic for AI development.

The relevance of legal theory

Such a cybernetic approach to an understanding of LKBS may also yield important lessons for the relevance of legal theory. Quite correctly, JURIX devoted considerable attention to legal theory during the 1994 Conference. Other conference papers have also raised issues of legal theory. There are some specific features of the approach of JURIX papers to legal theoretical issues. They are concerned largely with the narrow meaning of legal theory in the sense of an understanding of the structure of law rather than its place in society. (e.g.. Groendijk and Tragter JURIX 94) The underlying issue in which the assistance of legal theory has been called for has been that of whether it can assist the representation of legal knowledge. Much has been made of the open texture of law, and how to deal with it. Thus, den Haan and Winkels (JURIX 94) suggest the need to address the ‘deep structure’ of law. This, theoretical understanding justifies a departure from isomorphic representations and the

development of paraphrases which provide a relationship between surface and deep structures. Hage (JURIX 94) integrates Raz's theory of the role of reasons with his own approach to logical consequence. Underlying this is a process based approach in which conflicting rules are presented as reasons for supporting a particular perspective rather than a decision (Verheij and Hage JURIX 94).

However, the most significant debate appears to be the old one about rule based reasoning. The key contestants in JURIX conferences have both come from Anglo-Saxon jurisdictions. Moles (JURIX 92) criticises the dominance of rule based approaches on the basis that law is not about rules. His suggestion is that many researchers found a serendipity between tools particularly PROLOG and approaches to system development under which rules are said to have meaning without reference to the social framework within which they operate. In the circumstances, he suggests the way ahead lies with a semiotic approach to law; Stamper's (1991) approach is one in which informal knowledge is crucial and the task is to map communication of organisations in terms of the organisational norms and responsible agents. Bench-Capon (JURIX 94) vehemently defends his corner of the tradition of rule based representation, and the execution of the system as the deduction of the logical consequences of the represented knowledge. From his viewpoint, Moles' objections are effective only against naive rule based systems, because sophisticated systems distinguish different types of rule and their power or authority. In fact, Bench-Capon questions whether a jurisprudential approach to the representation of legal knowledge has any contribution to make.

The contention has broader significance than a narrow rejection of jurisprudence or legal theory. In the process of translation of existing legal cultures into artificial ones, new cybernetic relationships come into being. Bench-Capon's perspective appears to be that in the same manner as Deep Blue has been able to beat Kasparov without understanding the way Kasparov reasons, an LKBS can be developed to provide effective results to specific, if limited, problems. That is, it is the result that counts. This is a tenable perspective but has not, as yet, yielded any significant results. Nevertheless, it is also possible to argue that mere mimicking of the way lawyers reason will not produce the goods either, because computer systems have their own discipline. It is in this context that Wahlgren's notion (JURIX 94) of a general theory of AI and Law which develops an 'interdisciplinary' (I prefer 'integrated') approach combining legal theory and AI theory becomes significant. My own view is that cybernetics requires a fundamental recasting of both legal theory and AI theory in its application to law. We need to ask ourselves questions such as -

What purpose does legal theory serve?

Does it serve a real purpose in the process of translation into AI systems?

What purposes do AI theories serve?

Do they meet the real needs of the legal domain or are they merely rationalisations of programming techniques?

I do not have time to answer all these questions, but will attempt to throw some light on legal theory, while acknowledging that information scientists such as Bench-Capon are right to challenge the usefulness of current legal theories.

These positivist legal theories are internal rationalisations by lawyers of their own work. We can use either Luhmann (1982, 1985) and Teubner's (1984) autopoietic approach or Foucault's (1979) discourse theory to establish this (Cf Fish 1980). These internal rationalisations are not interpretations or explanations to the external world, but serve a number of symbolic, legitimating and constructive purposes and exist within the particular cultural environment. The process of translation of legal discourses into LKBS where key actors are not lawyers but knowledge engineers requires a process of interpretation and recasting of theory which requires a combination of internal and external perspectives. In the resulting new discourse of the LKBS, the knowledge engineer is not a neutral technician but a powerful participant. At present lawyers are weak during the actual production of the system, but as commissioners, users or controllers of paralegal users they have a very strong role in determining its success or failure.

Current legal theory approaches are not irrelevant but are limited precisely because they represent internal views of the law. What is required is illumination of these internal views by external views of the law. For example, there is an implicit assumption among both lawyers and AI specialists working with the law that what we are involved with is a single legal system which is used by lawyers and others in a uniform way. Yet, the work of legal pluralists such as de Sousa Santos (1995) Arthurs (1985) and (in the Netherlands) Griffiths (1986) questions this. Whatever the truth of pluralism may be, it liberates system developers into taking the user as their starting point and building the system from the perspective of the precise needs of the user, and not some "top down" approach to law.

Secondly, our obsession with hierarchical ordering of norms is based on positivistic approaches of Hohfeld, Kelsen, Hart et al. Yet, post-modernist approaches to text suggest that different texts include complex relationships to each other and to the users (Goodrich 1995). This suggestion is convincing, yet in all the argument about the nature of law and rules, there is very little consciousness of the complex nature of text. A translation of texts into LKBS without careful analysis must be a mistake.

Finally, there are numerous lessons to be learnt from study of law as cultural systems, particularly from legal anthropology, in which scholars such as von Benda Beckman (1985, 1991, Abel 1982, Moore 1973) have played a crucial role. Much information has been gleaned about culture change in the process of modernisation. The lessons of legal anthropology have been translated by people like Abel from traditional societies to contemporary Western ones. The transformation of our legal cultures into cyber-cultures requires precisely that type of anthropological study involving detailed observation of the current tools (law texts etc.), relationships (between lawyers, judges, academics, police, clients etc.) processes (litigation, negotiation) psychology (ideology, cognition, semiotics) and power. This is obviously hard work, not only that, it can not be easily translated into this or that LKBS. However, the relative lack of success of other approaches suggests the need to explore missing dimensions.

Jurimetricisation of society

There is of course an alternative to all this. Our assumption that LKBS have to be modelled on current legal cultures is an ideological one. It assumes that there are values in the law as it exists which need to be preserved or there will be threats to our constitutional order and democracy (Schmidt and van Besouw JURIX 92). But it is perfectly feasible to develop a jurimetrics culture which is not based on these ideological assumptions about legal culture. It is possible to argue that a culture based on complex but abstract mathematical formulae may produce more even justice than one in which a lot of room is provided for judicial discretion. Certainly the papers on sentencing policy presented at JURIX 92 have been based on the need for uniformity. I mention in my other paper at this conference (JURIX 97) that legislation is beginning deliberately to provide computable formulae for jurimetric decision making. In a very interesting paper, Tragter and Anja Oskamp (JURIX 95) have studied precisely this phenomenon in the Netherlands as well and suggest:

> One of the characteristics of legal decision support systems is that they tend to have regulative effects. This is due to the necessity to use standardisation within the systems, thus introducing rules prescribing a certain conduct of the user.

They give examples of the Lex Mulder and the Study Grants Act and a variety of other decision support as well as automated calculation systems as well. There are obvious differences between the impact of a decision support system developed after the development of primary legislation and a system developed as part of the legislative process. The authors suggest that while there may be some advantages in such systems, there is need for greater regulation and transparency.

This analysis can be taken further by recent UK experience. Popular opposition to the computable formula of the Child Support Act suggests that there may be more fundamental objections to jurimetric systems which do not take human factors into account (Paliwala JURIX 97).

Conclusions

This paper salutes the achievement of JURIX and the Foundation in sustaining an academic community for research and development over the last ten years.

The work has included both usable LKBS and fundamental research, the areas covered in the research have been broad and adapted to contemporary needs of research into ‘the real foundations’ of LKBS and development of systems that can support legal professionals in the performance of their tasks. This shift has been supported by pluralism in technique and a growing effort at integration of systems and tools. For the future, there is need to explore the opportunities provided by the internet.

While it is suggested by some authors that a shift has occurred in the form of knowledge representation from a focus on obtaining heuristics from domain experts to a focus on developing models of law based on ontologies, in my view the extent and nature of this shift remains controversial and involves judgments about the underlying nature of law and its translation within the legal context.

I suggest that a cybernetic approach to illuminating the detailed relationships involved in systems development may provide better guidelines for knowledge representation and legal theory. In addition, it can recast issues such as cost and other production factors involved.

A cultural transformation is involved in translating existing legal systems into LKBS. In such transformations, traditional positivistic legal theory should be seen as 'internal' rationalisations by autopoietic legal communities. A proper process of translation requires recourse to 'external' theories about law, which involve micro-analysis of legal cultures.

Alternatively, LKBS developed independently of cultural factors especially through the use of computable formulaic law may be leading to a jurimetricisation of society of a nature which requires careful regulation.

What paths do we tread in the future? Firstly there is no harm in following the cautious pluralistic approaches as outlined in last year's conference, both as to areas and techniques. In particular, there is every likelihood of continuing improvement in both processing power and software development (Paul and Cox 1996). However, if the development work is going to take proper advantage of these tools and techniques, then it has to start from first principles, which I suggest involves seeing systems development and use in cybernetic terms. This does not necessarily mean that everyone should start developing complete systems again, but their selection of development area and techniques should show cybernetic awareness of the processes of culture change. This means especially sensitivity to the skills and values involved in existing legal cultures, consciousness of limits of our own expertise and awareness of the scope for collaboration.

Research also needs to be addressed at cost and other development factors involved in a way which goes beyond simple Taylorist assumptions of legal automatons which leave no place for human intervention. There may be a need to rethink organisational issues in research and development work in ways which promote greater integration of effort. In particular, the opportunities provided by the internet need to be grasped.

Finally, the research which has already begun on the regulatory impact of jurimetricisation of society needs to be continued as part of the continued study of culture change.

At the beginning of this talk, I put aside all my Marxian hesitations and applied for novice membership of your club. I hope I have done enough to deserve it.

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