

ARTIFICIAL INTELLIGENCE AND THE LAW - INNOVATION IN A LAGGARD MARKET? -

by

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Abstract

This paper focuses on the development of Artificial Intelligence and law. It looks at the process of technical innovation with regard to the implications for the management of technology. Expert Systems, as a branch of Artificial Intelligence, are closely examined with particular reference given to Computer Assisted Document Drafting (CADD) applications.

Categories of Expert Systems discussed include diagnostic systems, procedural guides, intelligent checklists and document drafting. Diagnostic systems in law incorporate both the Rule Based System and Case Based Reasoning System. Procedural Guides are used to lead lawyers through complex rules and regulations. Checklists and Document Drafting assist with drafting complex documents where a number of steps are involved, thus acting as a time saving device, and also serving as a guide for junior lawyers in checking what questions need to be answered.

However, it is through the natural language interface of the computer keyboard that a user can compose and reply to questions in an understandable language. Hence, the interaction between people and the process engaged in the transfer of knowledge is crucial to the development of Expert Systems.

The diffusion process has been slow for Expert Systems in law. It is suggested that attitudinal and organisational changes are required in order for law firms to embrace further development of Expert Systems. An understanding of economic aspects such as costs, market structure and return on investments are highlighted. Finally the need for additional research into the management of technology in Artificial Intelligence and the law is emphasised.

Introduction

As far back as 1959 Mehl¹ envisaged two types of legal machine: an information (retrieval) machine and a consultation (judgment) machine. The first serious recommendation for research into the application of Artificial Intelligence (AI) to legal reasoning was made in the US in 1970 and working applications gradually began to emerge. Over 20 years later, in Australia, shortly to be released is one of the first large scale commercial applications in substantive law. This paper is concerned with the development of AI and

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1 Lucien Mehl *Automation in the Legal World in Mechanisation of thought Processes* (1959)

law and looks at the process of technical innovation over that time with regard to the implications for the management of technology in this area. One specific branch of AI concerns Expert Systems (ES) which will be examined with particular reference to Computer Assisted Document Drafting (CADD) applications.

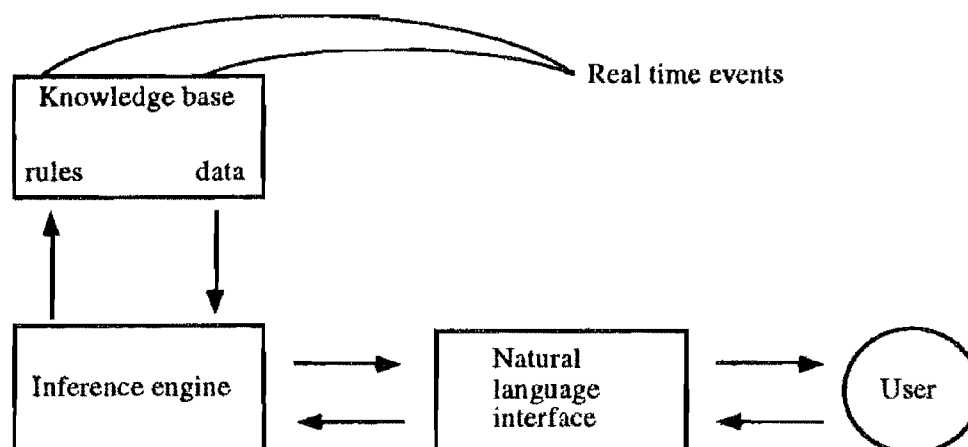
1. Definitions

Every paper on AI begins with definitions. This is no exception. AI is a branch of computer science directed towards making computers more "intelligent". The term AI is believed to have been coined by John McCarty in 1956 at a conference called "The Dartmouth Seminar Research Project on Artificial Intelligence". AI was divided into three main areas, namely robotics, natural language and ES. Generally, when people talk of AI and the law, it is the latter class of ES to which they refer.

What is an Expert System? It is thought to be a system that can replicate the knowledge and reasoning process employed by an expert (often referred to as a domain expert) to perform expert tasks. "Expert system technology is a limb of AI research that seems to implement human reasoning processes within problem solving programs".² ES are divided into three distinct parts. The knowledge base contains rules and data gathered from the domain expert as being pertinent to the area under review. The inference engine, which is the "clever" part of the system, is the "logic machine brain", which draws relevant information from the knowledge base and the user to infer an answer to the problem posed. Finally the natural language interface, through a computer screen or keyboard, allows the user to compose and reply to questions in an understandable language. ES can be represented³ as follows:

2 Graham Jefferson *Legal Expert Systems* (1991) 10: Uni Tas Law Review 71 p 73.

3 Taken from R Wright *The Cybernauts have Landed - A Practitioner's Guide to Expert Systems for the 1990's* 65:6 Law Institute Journal (of Victoria) p.490 (1991).



Schematic Representation of an Expert System

Thus the machine has to know what knowledge is available to the expert and how the expert reasons in order to access that knowledge and provide an intelligent answer to the user. Already it can be seen that the process is complicated by the interaction between humans and machines that must occur. Normally a "knowledge engineer" will convert the expertise of the domain expert into computer speak. A knowledge engineer must be able to communicate with the domain expert in such a way as to retrieve the expert answers. From a management perspective the interaction between people and process engaged in the transfer of knowledge is crucial to the development of ES. This technical and human integration in some organisations has been referred to as knowledge management.⁴

2. The Legal Reasoning Process

There has been much debate over the nature of the legal reasoning process.⁵ Oliver Wendall Holmes, one of the American legal realists, stated "the life of the law has not been logic; it has been experience". They would argue that lawyers make predictions of judicial and official behaviour and judges predict whether or not laws work for society and it is difficult to formalise such predictions. Susskind would argue "it is unduly restricted to think that building expert systems in law is simply about computerising legal

4 For an early discussion of knowledge management see Wiig K M *Management of Knowledge: Perspective of a New Opportunity* Proceedings from Gottlieb Duttweiler Institut Conference on Networking (November 1986).

5 See R Susskind *Expert Systems in the Law: A Jurisprudential Inquiry* Oxford: Clarendon Press 1987; E Risland *Artificial Intelligence and Legal Reasoning* Bradford/MIT press (1987).

reasoning: legal knowledge engineering reaches into the very core of jurisprudence and philosophy".⁶

Jurisprudence strives for a general and systematic understanding of law and of its administration in society. How lawyers think and work is one of the mysteries of this century. The mere fact that the debate is so vehement in academic circles leads one to conclude that there are different ways lawyers deal with different problems. The result is the process of focussing attention on areas of the law which are amenable to the development of ES that have developed gradually over the past decade. In terms of the development of ES in law, it is postulated that jurisprudential arguments, whilst being a haven for academics, may have retarded the commercial advance of such systems.

3. Types of Expert Systems in Law

From the computer system viewpoint there are two distinct types of system. Firstly there are rule based systems which look to primary sources of law such as statutes, and secondly case-based reasoning (CBR) systems which rely on case law for interpretation in the knowledge base. Problems can arise in rule based systems with semantic and syntactic vagueness.⁷ CBR systems have been criticised for not dealing with the interpretation of "open texture" areas of law. Computers reason deductively using basic "if X" "then Y" and "else Z" arguments. However lawyers also reason by analogy, for example when comparing like cases. It is possible to program mathematical formulas on the computer which give weighting to attributes within the case and which allows the computer to simulate reasoning by analogy. The drawback is the human time spent in analysing cases. However lawyers need to perform this task and surely it is better recorded once so that reinvention of the research wheel does not occur each time a similar question is raised and the case re-examined. These problems are mentioned to show the complexity of the task that management of ES in law involves.

3.1 Categories of Expert System

Susskind divides up ES into four categories of diagnostic, procedural guides, intelligent checklists and document drafting.

3.1.1 Diagnostic Systems and the Law

The most complicated development of ES in law is sophisticated diagnostic systems which incorporate both rule and CBR. In Australia (as worldwide) the development of these applications has been concentrated mainly in academic environments. DATALEX began in 1985 as a joint

6 *Op.cit.* p 44.

7 Layman Allen and C R Engholme *Normalised Legal Drafting and the Query Method* 29 *Jo of Legal Education* (1978) pp 380-412 explain semantic vagueness as the meaning of words or phrases and syntactic ambiguities concerning the grammar with connectors such as "and" which may be construed as "or".

research project at the University of Sydney, funded by the Australian Research Council. Professor Alan Tyree chose the field of chattel recovery to develop a case-based system and developed FINDER. Cases receive attributes which are statistically weighted by the domain expert. A user presents problems and the closest match between the problem case and knowledge base cases is found. This specialist area of law was intended not to be of commercial value but rather to demonstrate a working model.

This product has been developed further to produce the Privacy Workstation which is being used by Australia's largest credit bureau and the Australian Privacy Foundation. This system⁸ combines integrated theory for all aspects of the computerisation of legal materials in the form of ES, hypertext and free text retrieval tools. In effect it provides a suite of tools at the lawyer's disposal. The developers have asked for a more "consistent and comprehensive conceptual framework and terminology describing all the elements of computerisation of legal information". They compare this with the emergence of film technology when it began.

3.1.2 Procedural Guides

Procedural guides are those which can lead lawyers through complex rules and regulations such as Social Security, WorkCare applications and Planning regulations. A good example of an excellent system, which is the first large scale legal ES to near commercialisation in Australia, is that developed by Johnson and Mead⁹ who operate from a corporation called 'Softlaw under Computer Power' in Canberra. They have close links with government departments and have developed STATUTE which is an ES shell for rule-based applications. This system takes an active role in that it asks questions that may be overlooked by the best practitioner, and because it has a perfect memory it does not have an "off day". Such a system can lead to unbiased opinions and fairer decisions.

Softlaw are installing their system in New Zealand which is due to be operational from 1 July 1992 with 800 workstations to deal with the New Zealand Accident Compensation scheme. New Zealand adheres to a no-fault liability scheme which makes it particularly amenable to a rule based system. Their next project is to develop the Department of Veterinary Affairs Disability pensions. Their expert system shell is able to cope with numerous changes of the legislation and on the administrative side it is easier to update the system than procedural manuals. Their main aim was to provide easy maintenance and ease of use to enable clerks and non-lawyers to use the system. They have been asked by the American Bar Association to present their development as a "world showcase".

8 G Greenleaf, A Mowbray and A Tyree *The Datalex Legal Workstation - Integrating Tools for Lawyers* (1991) ACM 0-89791-399X/91/0600/0215.

9 P Johnson and D Mead *Legislative Knowledge Base Systems for Public Administration - Some Practical Issues* Softlaw Corporation Canberra ACM 1991; and *Natural Language - An Appropriate Knowledge Representation Scheme for Legislative Expert Systems* unpublished (1991).

Another example of a procedural guide is planning regulations.¹⁰ Tim Falkiner, a practising barrister, says "such expert systems must be either used *often* by the client or enable the client to expand their ability to deal with problems rather than referring such problems to another expert practitioner". Potential management problems may occur regarding the extent of liability for incorrect diagnosis issued by an ES. He thinks there has been lack of penetration in the market because of the lack of experts in the field able to set up and maintain such ES. As computer programmers and lawyers begin to understand more about one another's discipline those barriers may be broken down and benefit accrue from such co-operative understanding. Falkiner thought that it was not yet possible to produce ES economically because of high development costs. This product is aimed at lawyers who would consult ES rather than refer to an expert lawyer.

At Latrobe University the IKBALS II project deals with the statutory interpretation of the *Accident Compensation Act 1989*.¹¹ It focuses on WorkCare claims and entitlements and relies on a hypertext engine for its text representation. This allows the lawyer to browse through documents and check on references which link to another source. HyperCard is currently being used for that purpose. George Vossos, a PhD student, is currently developing a system to determine if customers are eligible for financial support under the *Credit Act* with a law firm in Melbourne. One of the difficulties he has encountered is in refining the system so that there is a decent user interface. It is important therefore to consider the natural language interface which involves an intimate knowledge of computer tools and methodologies as well as human ergonomics.

There appears to have been the most advance with procedural guides in legal ES. The above three illustrations show products aim at different types of end users being non-lawyers and generic lawyers. Any management of technology in this area needs to be aware who is the consumer in order to accommodate the introduction of the product to the market (the innovation process).

3.1.3 Intelligent Checklist & Document Drafting

These two types of systems are often combined in one, such as WorkForm which is an example of a CADD program. WorkForm was developed by an attorney in the US in 1983 and has been commercialised under Analytic Legal Programs Inc. The knowledge base in this system consists of a precedent base of documents which have to be settled by the expert. The user is prompted for specific answers to questions relating to a particular document. It works through a decision tree and can branch off on various paths dependent on particular answers given.

10 See M R Wigan and Tim Falkiner *Planning Regulations and Practitioner Development: Use of Expert Systems in Environmental Planning* Chapter 22 of Desktop Planning edited by P W Newton, M A P Taylor and R Sharpe Hargreen Publishing Co (Melbourne) (1988).

11 John Zeleznikow *Building Intelligent Legal Tools - The IKBALS Project* Latrobe University Technical Report No. 16/91 (November 1991).

These types of ES are particularly useful in drafting complex documents such as banking and finance loan facility agreements. Alternatively it is beneficial for packages such as winding up applications where there are a number of steps and documents which need to be completed. Intelligent checklists are generated to assist the senior lawyer review a juniors work. Also the checklist is a useful guide for the junior to see what questions need to be answered.

CADD applications are used in order to reduce the time taken in producing a first draft and to increase turnover of commonly used documents. For example LinkLaters and Paine, a large law firm in London, have increased Eurobond transactions from 200 to 5,000 per annum using WorkForm. Thus the types of documents drafted are important to identify the benefits to the firm's performance.

4. Technological Development

Research in ES in law traditionally has been in universities and lies within the field of basic research.¹² In Australia research and development accounts for 1.2% of GDP of which two thirds are done in universities. It is questionable whether Diagnostic systems in law are high technology.¹³ The rate of technical progress is not high and development appears to have been detained in the academic realm. It has provided a fertile ground for teaching, research in computer science and jurisprudential discourse. However the embryonic phase of risky state-of-the-art research has developed into a growth stage for a few practical applications such as the Privacy workstation and IKBALS project. These could be categorised as applied research.

Innovation in this field can be described as nuts and bolts rather than breakthrough and it has not been developed on a large scale. Innovation is about bringing ideas to the marketplace which is accomplished with the first commercial transaction. This has been achieved on a small scale basis with CADD programs. Most technological development is incremental and innovation, which is an accumulation of small steps, is typically known as nuts and bolts innovation. The first stage is recognition of technical feasibility and potential demand which leads to idea formulation. This is apparent in legal ES. The problem solving stage has been largely the realm of a knowledge engineer. There is still uncertainty about the efficacy of programs in determining a solution for diagnostic systems. The development stage is used to resolve these uncertainties before the solution is first utilised and diffused into the marketplace. Perhaps ES in law would be better re-classified as complex system innovation characterised by long-range planning which will ensure the technology is fine-tuned when the final development stage is reached.¹⁴

12 For discussion of research categories see OECD - Measurement of Scientific and Technical Activities (undated).

13 See P Krugman *Defining High-Tech* 1982.

14 See D G Marquis *The Anatomy of Successful Innovation* Magazine November 1969 for a discussion of aspects of innovation.

If the view is taken that "innovation is important not for increased wealth but to enable people to do things which have never been done before"¹⁵ then legal ES are proceeding along the right track. However successful management of technological innovation depends on understanding the economic aspects such as costs, market structure and return on investments (ROI). 60% of R&D projects reach technological completion; 30% of those are commercialised and 12% earn an economic profit.¹⁶

It is important to remember there is often a long introductory period in market creation so a typical product lifecycle may have 8-15 years in the introduction period as illustrated in Fig 1 which shows the phases of a product life cycle.

In Australia we would appear to be approaching that growth phase when the market is about to take off. With CADD the transfer of knowledge in the ES has taken over 2 years to reach a stage where a procedure has been developed which, when followed with specific applications, gives an acceptable output and can be repeated.¹⁷

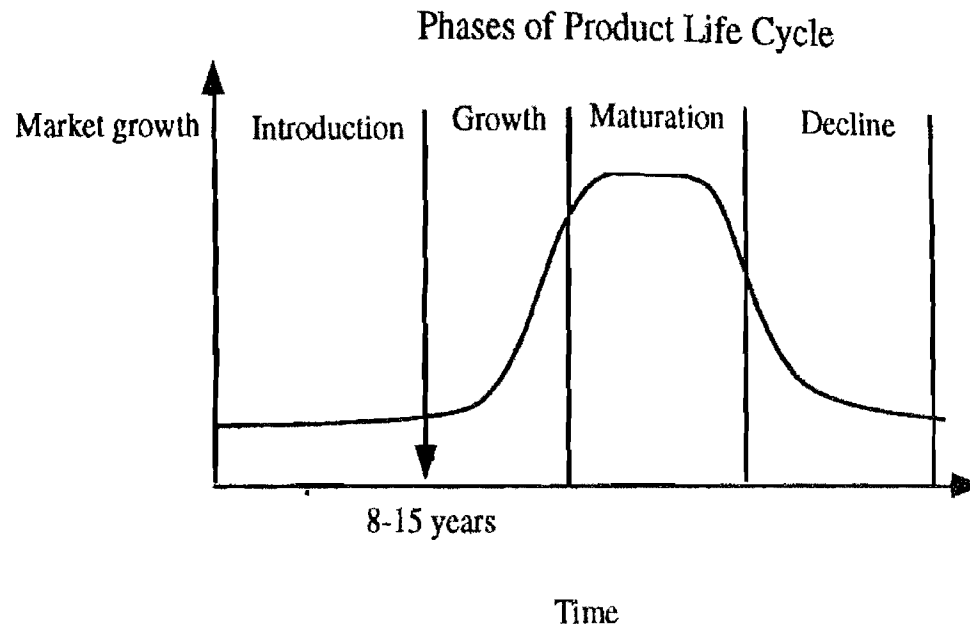
ES has arisen from a technology push in the legal area rather than a need-pull from the market. Lawyers are reluctant users of technology and few are creative in their work processes. Law firms operate as partnerships and traditionally any major decision has to be agreed by the whole partnership which has had a delaying affect on the diffusion process of technology.

15 Freeman *By Way of an Innovation in The Economics of Industrial Innovation* MIT Press Cambridge MA (1982).

16 E Mansfield *How Economists see R&D* Harvard Business Law Review November-December 1981.

17 Harvard Business School 1986 *An informal note on knowledge and how to manage it* 9-686-132.

FIG 1



5. The Diffusion Process

The diffusion process describes how people find out and adopt innovations. They are not willing to risk new technology unless there is some precedent to follow. In 1987 a computer technology survey¹⁸ was conducted by the Law Institute of Victoria; 267 (13%) out of a total 1,978 firms responded. The questionnaire had a greater proportional response from larger firms with over 11 partners. There was 60% positive response to the use of computers and greater productivity and improved output were seen as the most important benefits. Over 60% agreed that lawyers lagged behind in the effective use of technology. Despite the small sample this illustrates that most lawyers have a poor self image about how they manage and use technology.

5.1 Legal User Characteristics

In terms of innovativeness lawyers could be classed as laggards¹⁹ which are considered 16% of the total AI market. They are traditionalists and are suspicious of change which inheritably makes them a cautious breed. However, once they see the efficacy of a new product such as facsimile machines then the use of the product takes off with a vengeance. If the whole legal market is examined it is government agencies who are the early adopters of large diagnostic systems. Alan Tyree sees that most compelling

18 Law Institute of Victoria 1987 *Technology Questionnaire* from John McMillan of LINK (Lawyers' Information Network).

19 Rogers *Innovativeness and Adopter Categories in Diffusion in Innovations* (1983).

sites for legal ES are small offices and neighbourhood law centres.²⁰ The main use in the environment is where large numbers of relatively simple legal problems are encountered.²¹ ES have not gained widespread acceptance within law firms which may be for a number of reasons. One reason, it is suggested, may be the fear that ES may replace lawyers. Secondly the products are not efficient in legal work. However the main reason, it is suggested, is the lack of examination of the working methods of lawyers and how these can be made more efficient. These can be hurdles to the diffusion process.

The first stage of the diffusion process is knowledge of the product. It is essential to be receptive to the innovation so that you can make a preliminary judgement in order to be persuaded about the product. The decision to buy may involve trialing the product which is finally followed by confirmation of the product.

5.2 Product Characteristics

There are four product characteristics which should be taken into account in the management of legal ES.

1. Relative advantage and the level to which innovation is seen as cost benefit is important. In CADD the development and maintenance costs are high and it is difficult to recoup on use of documents drafted alone even when charged out at so much per page.
2. Trialability is difficult to effect with lawyers because of the amount of time they might have to spend in trialing something. Lawyers' time is money.
3. Complexity of the product is crucial in that the product must be simple and easy to use for lawyers. They do not want to spend valuable time learning a complicated program. Technophobia is a common ailment amongst lawyers.
4. Compatibility of the system with the current one is essential. It would be safe to say that nearly every solicitor's office would run on some kind of DOS system. This technical integration issue is becoming easier with Original Equipment Manufacturers (OEM's) realising the importance of systems being able to communicate effectively with one another.

6. Technology Strategies

The technology strategies adopted must take into account the following areas.

20 Alan Tyree *Will Justice Fall to Bits* Current Affairs Bulletin March 13, 16 (1986).

21 G Jefferson *Legal Expert Systems* 10: 2 Uni Tas Law Review p 71 (1991).

6.1 Economic value of ES

It appears to be rare in most industries, let alone law firms, that ES have resulted from a deliberate broad technical strategy relating to the business objectives of the organisation.²² For example they start as "skunkworks" within an organisation which are seen as not quite respectable and somewhat radical developments that grow from within. XCON was a skunkwork developed by Digital Equipment Computers to assist in the configuration of machines when selling and installing their VAX computers. XCON was allowed a free rein in the early days and was not shackled with the provision of ROI.

In a law firm investment in new technology is expected to show an immediate benefit through reduced costs, higher volume or direct billing results. In CADD, for example, the documents drafted are charged at a certain dollar amount per page in order to take account of development costs. However until a system is established it is difficult to show immediate economic returns, some of which may increase business objectives but which are not quantifiable. With CADD the transfer of knowledge in the ES has taken over 2 years to reach a stage where a procedure has been developed which, when followed with specific applications, gives an acceptable output that can be repeated.²³ Law firms need to take a long term view in the development of ES.

It is interesting to note that in the insurance and financial services industry in 1988 it was estimated²⁴ that the majority of systems are relatively small and have developed from "grass-roots" end users with pressing operational problems to solve. The economic value of the systems implemented to date may be unclear. Seeing that the market is technology driven in law firms applications are likely to develop only from enthusiastic and enlightened lawyers who are willing to devote resources and energy into the development, unless a broader strategy is adopted by the partnership.

6.2 Advantages

The sum of the parts is greater than the whole according to Systems Theory. It maybe therefore that the integration of various parts of ES, such as advocated in the Privacy work stations, will be implemented. In government agencies, where large numbers of relatively simple legal problems are encountered and may be answered by non-legal staff, ES are appropriate. The advantages are the elimination of bias and inconsistency that results because computers do not have an "off day".

22 Karl Wiig *Commercial Applications in Expert Systems in Production and Services* T Bernold and U Hillenkamp (eds) Elsevier Science Publishers B.V. (1988).

23 Harvard Business School 1986 *An informal note on knowledge and how to manage it* 9-686-132.

24 K Wiig *Op. cit.*

6.3 Risks Associated with Implementation, Capability of the System and Transfer of Knowledge

In law firms only relatively recently in the last decade have professionals been employed to manage the practice in areas such as finance, marketing, human resources, computer services and technical support. The idea of the business development of a partnership is relatively new. Thus transfer of knowledge to an expert system has to be carefully and tactfully managed in particular when the respect other professionals may have gained in other industries is not necessarily present in a law firm. Often these managers are non practising lawyers who consequently are seen as a bit "odd". This perception, which creates a barrier to technological development, needs to change. In terms of managing ES it is necessary to have a champion of the product to "sell" it to the firm and remind lawyers of its efficacy as well as monitor its use. Also that champion needs to react to client pressures and changes in the economic market in order to adopt appropriate applications for the time. The human resources employed in this field are as important as the technical resources developed in ES.²⁵

6.4. Organisational Changes

Changes in work practice in implementing ES may result in change in other work practices. For example different charging systems using value rather than hourly billing for drafting of documents will result in change of accounting methods. It is important to monitor these changes to ensure the system is being appropriately used both from the economic justification and also suitability of persons at the operating level.

Conclusion

AI and law began in universities and the development of ES has not entered the main growth phase but they are being implemented in small but significant ways. The Softlaw system is a milestone for administrative systems. It is recommended that lawyers analyse their methods of working more efficiently in order to take advantage of the benefits ES can offer. (One of these may be more leisure time for the lawyers!). CADD is one of the most straightforward types of ES to implement. However experience has shown that attitudinal and organisational changes may be necessary for law firms, in particular, to embrace the further development of ES. The knowledge transfer required for building ES necessitates considerable investment in time by the expert and development time of a knowledge engineer. However there are unquantifiable benefits of sharing such knowledge which makes the task and development of technology worthwhile. Finally, like all good papers, it is recommended that further research into the management of technology is conducted in AI and the law, from the consumer's (lawyer's) point of view.

25 An article in The Australian June 12 1992 *Workforce troglodytes Under Attack* suggests computer specialists need to be as much interested in humans as in machines.

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