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Can Artificial Intelligence And Online Dispute Resolution Enhance Efficiency And Effectiveness In Courts

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Abstract:

The growing rise in the number of self-represented litigants has negative implications for both the court system and access to justice. The expanding use of Artificial Intelligence and the World Wide Web has led to the development and use of Online Dispute Resolution. In this article, we investigate a number of systems in Australian Family Law that enhance Alternative Dispute Resolution and Access to Justice. We discuss how a hybrid system that incorporates advice about Best Alternatives to Negotiated Agreements (BATNAs) and potential trade-offs as well as allowing online communication can enhance access to justice.

Keywords: Self-Represented Litigants, Access to Justice, Online Dispute Resolution, Artificial Intelligence

1. Introduction

The growing rise in the number of litigants who represent themselves in court has undesirable consequences for the administration of justice (Zeleznikow 2002). As early as 1999, a study conducted for the American Bar Association in the Supreme Court of Maricopa County, Arizona, USA indicated that at least one of the parties were self-represented in over 88% of domestic relations cases and both parties were self-represented in 52% of the cases. Meachem (1999) reports that 24,416 of the 54,693 cases opened in the US Court of Appeals in 1999 were filed by pro se appellants[2]. Many pro se appellants have neither the financial resources nor the legal skills to conduct their own appeals. Quatrevaux (1996) notes that there is a shortfall in legal systems for poor persons residing in the United States.

In Washington State, for example, a 2003 study found that more than three-quarters of all low-income households experience at least one civil (not criminal) legal problem each year. In the aggregate, low-income people experience more than one million important civil legal problems annually; low-income people face more than 85% of their legal problems without help from an attorney. The United States Courts are overwhelmed with a flood of Self Represented litigants, who represent as much as eighty percent of the caseloads in certain jurisdictions, and millions of others who don't get to court at all (Almeida 2013).

Branting (2001) claims that domestic abuse victims are particularly likely to have few resources and little opportunity to obtain the services of a lawyer. He states that the growth of the consumer movement has increased the trend for pro se litigation. The growing availability of books, document kits and computerized forms—together with the increasing availability of legal materials on the World Wide Web—has increased the opportunities for Self Represented litigants to organize their own litigation.

Greacen (2014) notes that in USA:

(1) most self-represented litigants do not choose to represent themselves, instead they have no alternative;

(2) judges who follow recognized best practices for dealing with self-represented litigants encounter no unusual ethical issues;

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[2] Also known as Self Represented Litigants

(3) self-represented litigants, when given appropriate accommodation, are able to obtain fair outcomes reflecting the facts and law applicable to their cases;
(4) cases involving self-represented litigants consume far less court and judicial resources than cases in which both sides are represented; and

(5) self-represented litigants constitute a potentially lucrative market for the delivery of limited-scope representation by the private bar.

Tata (2000) said*: The idea of the legal academic (let alone a judge) using a computer was even 15 years ago considered quirky but is now increasingly commonplace. As the unrelenting belief in the necessity for computers at every level of work gathers pace the notion that the issues facing judicial decision-making can be in some way, if not solved, alleviated by the production of systems to support judgement-making seems commonsensical.*

In the same issue of the journal, Scholberg (2000) said: *The Internet is rapidly converging information and communication technology and will also be the future basis for the court technology, both in the individual countries and on the international level. It provides the opportunity for Supreme Courts around the world to serve the global legal communities as a global database, and the integration of Judicial Decision Support Systems on the Internet is an important challenge.*

More recently, Schild and Kannai (2009) claimed that: We have in the past been involved in building Decision Support Systems for sentencing of various kinds. All were favorably received by the judiciary, legal practitioners and the police. None of these systems are in actual use.

But finally, in 2017, Sir Henry Brooke observed that he saw evidence that the future had at last, at very long last, arrived (Brooke 2016). It involved the development of the e Bundles and Digital Court System[3].

Thus, it is important for us to investigate how the use of technology, especially artificial intelligence, the internet and Online Dispute Resolution can help the functioning of courts and provide better support for pro se litigants. Conducting such research will provide self -represented litigants with important knowledge as well as providing useable systems. We shall discuss these issues in this article.

2. Self-Represented Litigants

Many legal processes within the Australian civil justice system operate with an implicit assumption that the parties have legal representation. This is also true in other Common law countries such as England and Wales and the United States of America. Increasingly, this is not the case, with self-represented litigants ('SRLs') accounting for between 17 and 93 per cent of parties in Commonwealth courts and tribunals, depending on the nature of the case and informality of the forum (Richardson et al 2012). A 'SRL' is defined as 'anyone who is attempting to resolve any component of a legal problem for which they do not have legal counsel, whether or not the matter actually goes before a court or tribunal' (Richardson and

[3] In paying tribute to Justice John Tanzer, lately a Circuit Judge based at Croydon Crown Court, England, UK, Brooke claimed that Tanzer has played a leading role in two developments which will greatly enhance the lives of every working judge.

A. *ejudiciary*
Its fundamental concepts were, and still are, that it should be a judicial IT system which was:
1. Independent from that of the civil service;
2. Accessible from any internet connected device irrespective of the nature of the device or the physical location of the user;
3. Usable either through a web browser by simply typing in [the URL] or capable of being integrated into desktop and mobile applications;
4. Capable of operating as a One Stop Shop for all the resources needed by a judge;
5. Built on existing proven off the shelf technology;
6. A subscription service subject to constant automatic updating and therefore not ossified by expensive requests for services; and, finally
7. The provider to full time judges of up to five copies of the latest version of Microsoft Office software.

B. *eBundles and the Digital Court System* which incorporates:
A. A bundling side where all case papers can be aggregated;
B. Papers given Information Rights (IRM);
C. A User Interface so that the data can be deployed in the court room.
See https://sirhenrybrooke.me/2016/08/01/judge-john-tanzer-retires-his-massive-contribution-to-judicial-i-t/ last viewed 2 February 2017

Sourdin 2013). While limited legal aid and rising legal costs *compel* some parties to self-represent, others *choose* to do so.

Navigating the legal system can be stressful for SRLs and involve significant personal and financial costs (Richardson and Sourdin 2013). While various process changes have been made to assist them, SRLs pose challenges for legal practitioners, court staff and the judiciary (Zorza 2009). SRLs often lack knowledge of legal issues or procedures and have difficulty negotiating good outcomes or presenting their case to a court or tribunal. These factors can also impact on opposing litigants and raise issues of actual and perceived fairness (Zorza, 2009).

The swelling tide of self -represented litigants constitutes a growing burden not only on the judiciary but also on the entire legal process. Typically, unrepresented litigants (Branting 2001):

(1) Extend the time taken for litigation—due to their lack of understanding of the process.

(2) Place them at a disadvantage compared to their opponent(s).

(3) Place the judicial decision-maker in the difficult position of deciding how much support and forbearance the decision-maker should offer to the Self Represented litigant.

Self-representation has ramifications for a key principle underpinning civil society – fair and equal access to justice for all citizens and the effective operation of the civil justice system.

While SRLs are often portrayed as placing additional burdens on an already strained legal system (Stewart 2011), some tribunals are accustomed to SRLs and view legal representation as unusual and/or unnecessary (ACJI. 2012).

There is evidence that suggests there are different types of SRLs (Stratton 2007) who will have different education and skill levels, motivations and reasons for self-representation – and therefore different needs. Despite assumptions that cost is a driving force in self-representation, this is not always the case. SRLs may have received no legal advice, a little or a lot.

Earlier research conducted in the Australian Family Court shows that there are a range of reasons why people self-represent, such as funding cuts and changes in eligibility for legal aid (Hilbert 2009). Other contributing factors include changes in technology, cultural shifts towards self-help and self-representation, and changes in legislation (Hunter et al. 2003). Economic conditions such as the global economic crisis have also lead to increases in self-representation (Zorza 2009).

Australian law has generally accepted that SRLs are at a disadvantage in legal proceedings and their experience of the legal system may indeed be negative (*Re F: Litigants in Person Guidelines* (2001) 161 FLR 189). SRLs' lack of legal knowledge and skills means that some are not able to access fair and equal justice in a system often geared towards legal representation. Some evidence suggests that SRLs take up more court time and demand more staff and judicial attention than represented litigants; in turn they may become stressed and emotional dealing with registry and court staff (Zorza 2009). Court staff and judicial officers also experience stress and frustration in dealing with SRLs (Zorza 2009), which, logically, could extend to opposing parties and their legal representatives. While some SRLs can present their case competently, most research suggests that SRLs struggle with substantive law and procedure (Genn and Genn 1989).

Self-representation can have an impact on settlement rates, case outcomes and case duration (Hilbert 2009), but this impact varies significantly according to case complexity and the forum. Recent randomized controlled trials in the US, investigating the impact of representation have produced mixed results, showing the impact to be highly forum specific (Greiner and Pattanayak 2012).

3. Self-Represented Litigants and Information Technology

Tata (2000) claimed:

One obvious benefit of JDSS centres around the productivity gains which computer technology promises. Of course, when one talks of productivity in a judicial context the obvious question is: 'productive'-in what sense? What does judicial decision-making produce? If judicial decision-making aims or should aim to widen 'access to (legal) justice', then decision support systems hold the promise to achieve this increased access.

It is vital to understand what support and assistance SRLs need as they navigate the legal system. There have been programmatic and policy responses that seek to improve access to justice for SRLs (Hilbert 2009), including written information in plain language and practice guides, and training for the judiciary on supporting SRLs (Richardson and Parties 2004). Other approaches include providing tailored guides to support self-helpers to complete legal work of a transactional nature (Lawler et al. 2012), outreach workers or dedicated court staff who assist SRLs with procedural advice, and formalized pro bono schemes. Increasingly, the trend, particularly in the US, is towards self-help centers or clinics, and providing a triage approach (Hilbert 2009). Other approaches include task assistance programs or technological support via websites that help potential litigants assess whether or not they have the capacity and skills to self-represent, or help SRLs assess the strength of their case (Zeleznikow 2002).

Branting presented a four-component model for pro-se litigants. The model was implemented in the Protection Order Advisory System an advisory system for pro se Protection Order applicants. It was constructed in conjunction with the Idaho Supreme Court because the inability to offer advice to pro se protection order applicants was distressing to staff in Idaho courts. The system permits protection order applicants to obtain answers to many of their questions about whether they satisfy the requirements for a protection order. If so, the system helps them draft the appropriate application (Branting 2001).

The opening session of the Third International Symposium on Judicial Support Systems held at Chicago Kent College of Law, in 1999, had as its theme 'What can judicial decision support systems do to improve access to justice?' John Zeleznikow presented an article at the symposium with the title 'Legal Aid and Unrepresented Litigants: Building Legal Decision Support Systems for Victoria Legal Aid'. In Zeleznikow (2002) he discussed the demands that the rise of pro se litigation poses for the judicial system and how community legal services can help meet these challenges through the development of web-based decision support systems.

According to Staudt (2005) discussing the Illinois Legal Needs Study the justice system failed to meet the legal needs of the state's neediest justice customers[4]. The Access to Justice: Meeting the Needs of Self-Represented Litigants: A Consumer Based Approach project (Meeting the Needs Project) successfully identified the major barriers to access to justice for self-represented litigants including barriers to Web-based document preparation. A key insight was that users need to be guided through processes that are foreign to them. The simple act of filling out forms raises unique challenges that the many self-represented litigants have trouble overcoming. Without a very simple front end, a user unfamiliar with web conventions would be unable to use online form systems. To be effective, guided interviews for self-represented litigants must be very simple.

Justice Dixon[5] discusses how the District of Columbia Courts are evaluating what works best in a high-tech courtroom for making presentations and instructing juries. He discusses:

1. Video displays;
2. Annotation monitors;
3. Witness monitor;
4. Evidence camera;
5. Laptop Connections and Other Digital Input Locations;
6. Combination VCR/CD/DVD Player;
7. Courtroom Printing and Electronic Storage of Exhibits;
8. Integrated Controller;
9. Wireless Installation; and
10. Remote Witness Testimony and Video Conferences.

Staudt and Madeiros (2013) argue that the technology changes triggered by the global economic crisis of 2008 have changed the tools that lawyers use to deliver legal services. New lawyers entering the profession must be ready to practise in today's more efficient and more technology-driven workplace. They argue that the following issues must be addressed:

1. E Discovery;
2. Legal Process Management;

[4] *Meeting the Needs of Self-Represented Litigants: a Consumer Based Approach* was a study completed by the National Center for State Courts and The Illinois Institute of Technology's Chicago-Kent College of Law and the Institute of Design http://www.kentlaw.iit.edu/institutes-centers/center-for-access-to-justice-and-technology/a2j-author . Last viewed 19 November 2016

[5] http://www.ncsc.org/~/media/Microsites/Files/Future%20Trends/Author%20PDFs/Dixon.ashx last viewed February 2 2017

3. Personalized Legal Services; and
4. Legal needs of low income people.

Recently, such needs are finally being addressed. According to an American Bar Association study, at least 40% of low and moderate-income households experience a legal problem each year. Yet studies show that the collective civil legal aid effort is meeting only about 20% of the legal needs of low-income people[6]. In December 2013, The US Legal Services Corporation (LSC), the USA's largest funder of civil legal aid programs for low-income people, published a report, The Summit on the Use of Technology to Expand Access to Justice[7]. Their Vision of an Integrated Service-Delivery System Technology can and must play a vital role in transforming service delivery so that all poor people in USA with an essential civil legal need obtain some form of effective assistance. Their strategy for implementing this vision has five main components:

1. Creating in each state a unified "legal portal" which, by an automated triage process, directs persons needing legal assistance to the most appropriate form of assistance and guides self-represented litigants through the entire legal process;

2. Deploying sophisticated document assembly applications to support the creation of legal documents by service providers and by litigants themselves and linking the document creation process to the delivery of legal information and limited scope legal representation;

3. Taking advantage of mobile technologies to reach more persons more effectively;

4. Applying business process/analysis to all access-to-justice activities to make them as efficient as practicable; and

5. Developing "expert systems" to assist lawyers and other services providers.

In April, 2016 LSC announced the development of online, state-wide "legal portals" to direct individuals with civil legal needs to the most appropriate forms of assistance[8]. LSC are partnering with Microsoft Corporation and Pro Bono Net to develop portals for up to two state-wide pilots intended to demonstrate how this approach can be replicated as widely as possible in an economic fashion. The portals are intended to help the legal aid community, courts and other state justice partners to provide some form of effective assistance to everyone with a civil legal problem.

The 17th annual Technology Initiative Grants (TIG) Conference was held January 11-13, 2017 in San Antonio, TX. The program highlighted a special initiative focused on improving the quality of legal aid websites. Through support from the Ford Foundation, LSC has worked closely with EY Intuitive, a digital consulting firm with expertise in user-centered design and non-profit evaluation, to conduct a comprehensive assessment of all of the state-wide legal aid websites. At the conference, representatives from EY Intuitive shared the results of this assessment, including practical findings and recommendations that will help steer the community towards creating content-rich sites that provide high-quality user experiences[9].

Zeleznikow (2002) argues that the development of legal decision support systems should lead to:

1. Consistencies — by replicating the manner in which decisions are made, decision support systems are encouraging the spread of consistency in legal decision making.
2. Transparency — by demonstrating how legal decisions are made, legal decision support systems are leading to better community understanding of legal domains. This has the desired benefit of decreasing the level of public criticism of judicial decision making[10].
3. Efficiency — one of the major benefits of decision support systems is to make courts and law firms more efficient.
4. Enhanced support for dispute resolution — users of legal decision support systems are aware of the likely outcome of litigation (their BATNA[11]) and are thus encouraged to avoid the costs and emotional stress of legal proceedings.

[6] https://www.probono.net/ Last viewed 2 February 2017
[7] http://www.lsc.gov/sites/default/files/LSC_Tech%20Summit%20Report_2013.pdf Last viewed February 2 2017.
[8] http://www.lsc.gov/media-center/press-releases/2016/legal-services-corporation-launches-pilot-program-increase-access-0 Last viewed February 2 2017.
[9] http://www.lsc.gov/meetings-and-events/tig-conference Last viewed February 2 2017.
[10] Judges of the Family Court of Australia are worried about criticism of the court, which has led to the death of judges and physical attacks on courtrooms. They believe enhanced community understanding of the decision-making process in Australian Family Law will lead to reduced conflict.

Whilst Zeleznikow (2002) did not claim that the construction of legal decision support systems will have a drastic effect on improving access to justice, he did believe that the construction of such systems for community legal centers will improve their efficiency and increase the volume of advice they can offer. Fourteen years later the courts and legal community are expressing an interest in using Artificial Intelligence and Online Dispute Resolution to provide advice for disputants and especially SLR's. It is interesting to reflect on why such changes have occurred.

Basically, I believe there are two reasons for this change:

a) Efficiency - the legal community and the courts have moved away from the taxi meter approach to charging and have become concerned with providing efficient advice.

b) Acceptance of the use of the World Wide Web - legal professionals finally accept that the internet can be a safe way of conducting transactions and can be used to provide important advice and collect useful data.

The pioneering work of Kahneman and Tversky (Kahneman 2011) claims that human beings are hardly rational economical agents, at least they do not formulate utility functions, the pursuit of which they are expected to conduct with relentlessness and consistency. However, the development of intelligent systems is finally being recognized as being capable of providing useful advice despite issues of bias and law in legal domains.

4. Online Dispute Resolution

Online Dispute Resolution (ODR) is a concept developed circa 1996. At that time the focus was upon the resolution of disputes that originated online. The prevailing belief was that those whose disputes that originated on the internet would find little difficulty in attempting to resolve these disputes via the World Wide Web. For most of the past twenty years, ODR research has focused upon electronic commerce disputes. Only recently, has ODR focused upon non-financial disputes and disputes that do not originate online.

For example, The 15TH ODR Conference, held in the Hague, Netherlands, 23-24 May 2016, had as its focus Can ODR really help courts and enhance access to justice [12] Issues that were considered include:

a) The collection of information online;
b) The provision of online advice; and
c) The ability to request judicial intervention online, e.g. obtaining domestic violence intervention orders online.

After two decades, the legal community is finally realizing the potential for Online Dispute Resolution to enhance Access to Justice. Chicago Kent College of Law teaches an *Access to Justice and Technology* subject in its JD program[13]. Issues of ethics and governance are finally being considered (Ebner and Zeleznikow 2016) indicating that the field has become mature. Casanovas and Zeleznikow (2014) discuss how relational law, relational justice and regulatory systems be linked to the newer versions of Online Dispute Resolution Whilst there is a recently found interest in this topic amongst the legal community, academic discussions and research in this discipline first occurred at the birth of the internet – two decades ago – such as the third Annual Forum on Online Dispute Resolution held at the University of Melbourne Law School in 2004.

5. Artificial Intelligence and Online Dispute Resolution

5.1 Artificial Intelligence and Law

(Zeleznikow 2002) states that when considering decision making as a knowledge-manufacturing process, the purpose of a decision support system is to help the user manage knowledge. A decision support system fulfils this purpose by enhancing the user's competence in representing and processing knowledge. It supplements human knowledge management skills with computer-based means for managing knowledge. A decision support system accepts, stores, uses, receives and presents knowledge pertinent to the decisions being made. Its capabilities are defined by the types of

[11] Fisher and Ury (1981) introduced the idea of a BATNA as one's best alternative to a negotiated agreement. The reason you negotiate with someone is to produce better results than would otherwise occur. If you are unaware of what results you could obtain if the negotiations are unsuccessful, you run the risk of entering into an agreement that you would be better off rejecting; or rejecting an agreement you would be better off entering into.

[12] See https://20160dr.wordpress.com/ last accessed September 13 2016

[13] See http://www.kentlaw.iit.edu/courses/jd-courses/jd-seminars/access-to-justice-and-technology last accessed November 20 2016

knowledge with which it can work, the ways in which it can represent these various types of knowledge, and its capabilities for processing these representations.
It should be stressed there is a major difference between decision support and decision making. Decision support tools help decision-makers improve their performance. Decision-making tools automate the process, leaving a minimal role for the user.

Artificial Intelligence is a field of study and application concerned with identifying and using tools and techniques that allow machines to exhibit behavior that would be considered intelligent if it were observed in humans (Holsapple and Whinston 1996)

Tools that have been used to develop intelligent negotiation support systems include:

Rule-based reasoning - In the rule-based approach, the knowledge of a specific legal domain is represented as a collection of rules of the form IF <condition(s)> THEN action/conclusion.

For example, consider the domain of driving offences in Victoria, Australia. Drivers can lose their license either by being drunk whilst driving, or exceeding a specified number of points in a given time. More specifically, probationary drivers (those who have held a driver's license for less than three years) are not permitted to have even a trace of any alcohol in their blood. Other drivers must have a blood alcohol level not exceeding 0.05%. This knowledge can be modeled by the following rules: (a) IF drive(X) & (blood_alcohol(X) > .05) & (license(X) >= 36) THEN licence_loss(X); (b) IF drive(X) & (blood_alcohol(X) > .00) & (license(X)< 36) THEN licence_loss (X)

Case-based reasoning – Case-based reasoning is the process of using previous experience to analyze or solve a new problem, explain why previous experiences are or are not similar to the present problem and adapting past solutions to meet the requirements. Precedents play a more central role in Common law than they do in Civil Law and are therefore the most obvious application of adversarial case-based reasoning in the legal domain. However, partly due to the electronic availability of case law, in particular via the internet, the role of precedents seems to become at least informally more important in Civil Law countries. Using the principle of stare decisis, to make a decision in a new case, legal decision-makers search for the most similar case decided at the same or higher level in the hierarchy. A comprehensive discussion of the application of this approach to the legal domain is provided in Ashley (1992).

Machine learning – Machine learning is that subsection of learning in which the artificial intelligence system attempts to learn automatically. Knowledge Discovery from Databases is the 'non-trivial extraction of implicit, previously unknown and potentially useful information from data.' Data mining is a problem-solving methodology that finds a logical or mathematical description, eventually of a complex nature, of patterns and regularities in a set of data (Fayyad et al 1996). An in-depth discussion of Knowledge Discovery from Legal Databases can be found in Stranieri and Zeleznikow (2005).

Whilst artificial intelligence can provide useful and innovative solutions to complex problems, check lists and template systems can be very useful to support decision-making, rather than make decisions. The Sixth Judicial Circuit of Florida provides a useful checklist for Representing Yourself in Court[14].

Kannai et al (2007) examine different levels of legal discretion. They consider issues of binary nature of decisions (versus a continuum), open texture and boundedness for distinguishing what techniques should be used in a given legal domain.
Much of the seminal work in Artificial Intelligence and Law came from law professors Kevin Ashley (1991), Thorne McCarty (1977) and Richard Susskind (1987). An excellent discussion of such work can be found in Zeleznikow and Hunter (1994).

For the past thirty years, Artificial Intelligence, Expert System, Case Based Reasoning and Machine Learning have been used by the legal profession, often in court related circumstances {(Zeleznikow and Hunter 1994), Stranieri and Zeleznikow (2005) and Lodder and Zeleznikow (2010)}. Zeleznikow and his research group at the Donald Berman Laboratory, Latrobe University, Melbourne, Australia, used a number of inferencing techniques in legal domains, including: association rules, case-based reasoning, machine learning, neural networks and rule induction. Domains investigated include: Workers Compensation (IKBALS), Credit Law (CAAS), Family Law Property Distribution (Split Up), Family Law Mediation (Asset Divider), Refugee Law (Embrace), Eligibility for Legal Aid (GetAid), Copyright Law (RightCopy), Eye-Witness Identification (ADVOKATE), Examining the causes of death (natural causes, suicide or homicide), Sentencing and the Building Industry. Examples of such systems that we shall examine include GetAid, Split Up and Asset Divider.

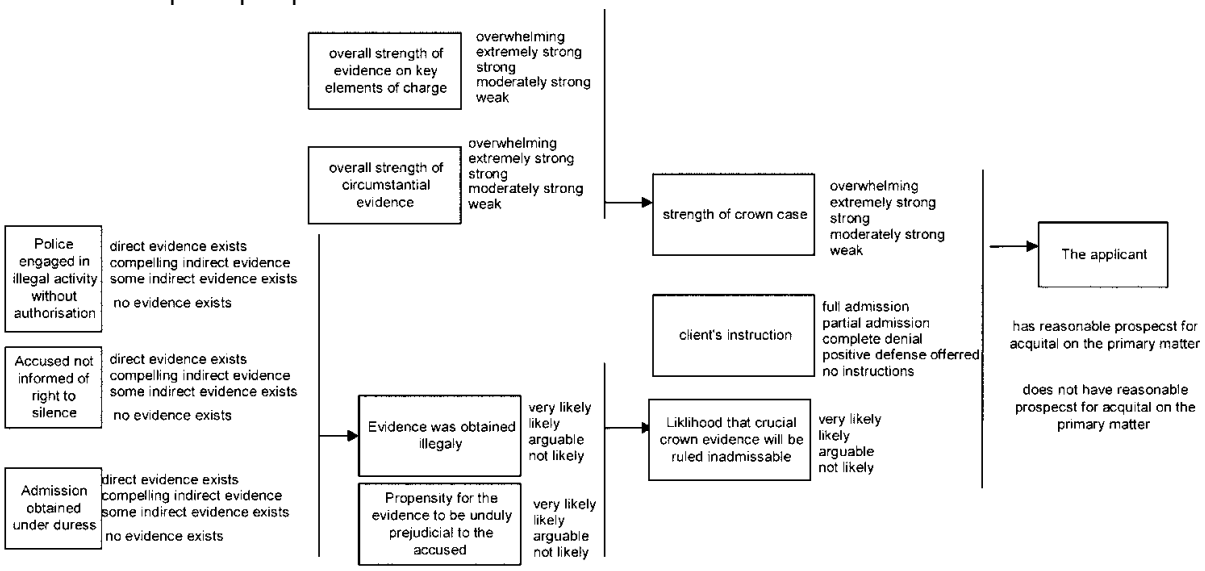
[14] http://www.jud6.org/generalpublic/representingyourselfincourt.html last viewed February 2 2017

5.2 The Get Aid System

In 2002, when an applicant approached Victoria Legal Aid (VLA), her application was assessed to determine whether she should receive legal aid. At that time the task chewed up 60% of VLA's operating budget, yet provided no services to its clients. After passing a financial test, applicants for legal aid needed to pass a merit test. The merit test involved a prediction about the likely outcome of the case if it were to be decided by a Court. VLA grants officers, who have extensive experience in the practices of Victorian Courts, assessed the merit test. This assessment involved the integration of procedural knowledge found in regulatory guidelines with expert lawyer knowledge that involved a considerable degree of discretion.

Decision Trees[15], which can be turned into Rule-based systems were used to determine whether an applicant for legal aid, who is scheduled to appear in a minor (Magistrates) court, has met statutory guidelines. Since experts could not readily represent knowledge about an applicant's prospects for acquittal as a decision tree, they decided to model the process as a tree of Toulmin arguments[16].

An argument tree for acquittal prospects is



A user consults the GetAid system via web pages as indicated in the following figure

[15] A decision tree is an explicit representation of all scenarios that can result from a given decision. The root of the tree represents the initial situation, whilst each path from the root corresponds to one possible scenario (Stranieri and Zeleznikow 2002).

[16] Toulmin (1958) stated that all arguments, regardless of the domain, have a structure that consists of four basic invariants: claim, data, warrant and backing. Every Toulmin argument makes an assertion. The assertion of an argument stands as the claim of the argument. A mechanism is required to act as a justification for the claim, given the data. This justification is known as the warrant. The backing supports the warrant and in a legal argument is typically a reference to a statute or precedent case.

Advice is given in the figure below.

The GetAid system was tested by VLA experts and developed in conjunction with web-based lodgment of applications for legal aid (Hall et al. 2002). It was expected that commencing the middle of 2003, VLA clients would use the GetAid system. This never occurred. The system was used in house for five years before being discarded.

As with the development of all decision support systems, the outcome is far more important than merely giving advice. It provides important information, allowing users to understand processes in modelling the domain and hence increases the likelihood of users engaging in Alternative Dispute Resolution.

5.2 An Artificial Intelligence Model for Online Dispute Resolution

Lodder and Zeleznikow (2012) conducted a detailed investigation of Artificial Intelligence in Online Dispute Resolution. Lodder and Zeleznikow (2005) advocate a three-step process in the development of Online Dispute Resolution systems. Their proposed three-step conforms to the following sequencing.

1. First, the negotiation support tool should provide feedback on the likely outcome(s) of the dispute if the negotiation were to fail – i.e., the "best alternative to a negotiated agreement" (BATNA).

2. The tool should attempt to resolve any existing conflicts using argumentation or dialogue techniques.

3. For those issues not resolved in step two, the tool should employ decision analysis techniques and compensation/trade-off strategies in order to facilitate resolution of the dispute.

Finally, if the result from step three is not acceptable to the parties, the tool should allow the parties to return to step two and repeat the process recursively until either the dispute is resolved or a stalemate occurs. A stalemate occurs when no progress is made when moving from step two to step three or vice versa. Even if a stalemate occurs, suitable forms of ADR (such as blind bidding or arbitration) can be used on a smaller set of issues.

By narrowing the issues, time and money can be saved. Further, the disputants may feel it is no longer worth the pain of trying to achieve their initially desired goals.

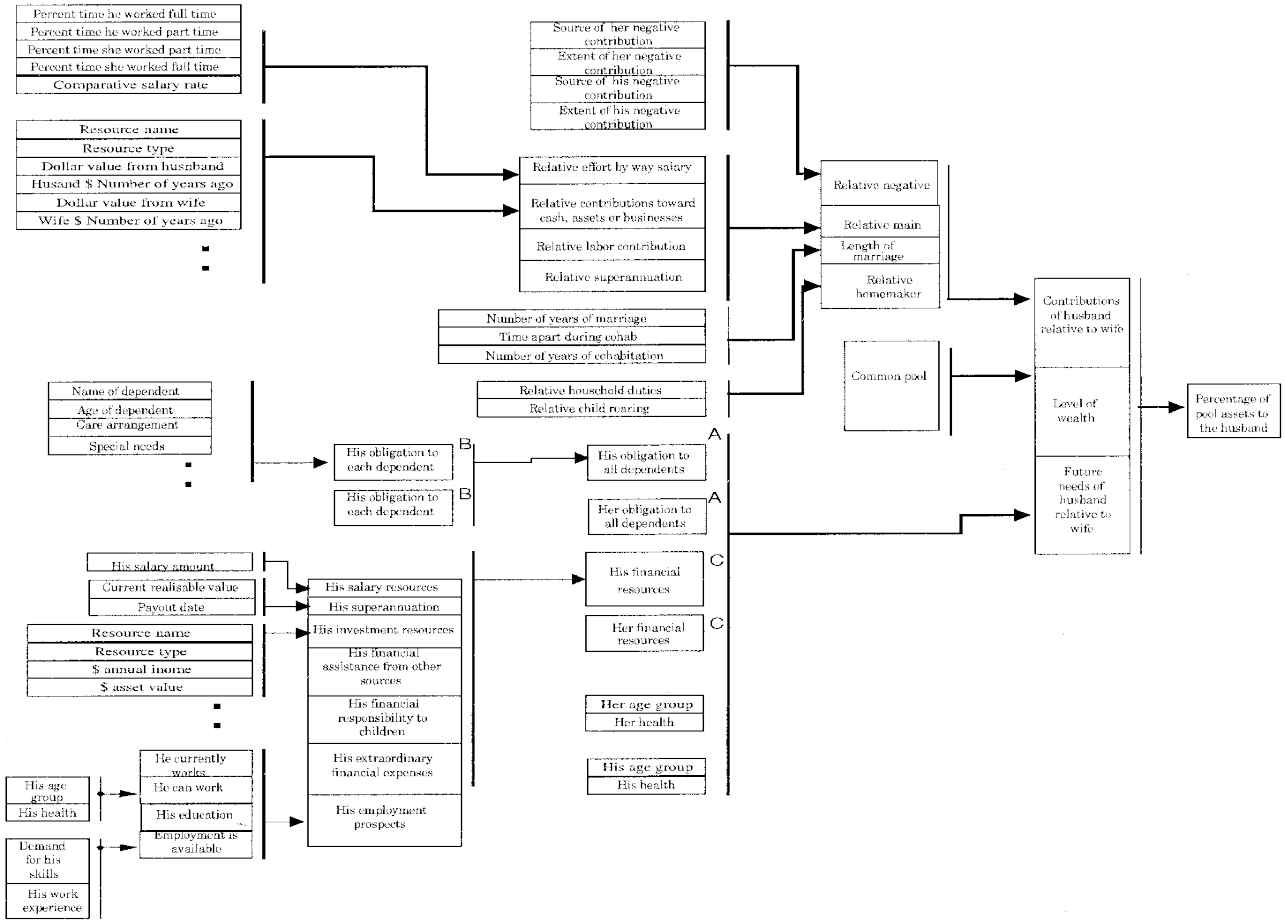
Much of our research has been dedicated to help Self Represented Litigants in the domain of Australian Family Law understand the processes and potential outcomes of their disputes. In particular, our work encourages such litigants to engage in Alternative Dispute Resolution[17]. In the following sections, we shall provide examples of three systems we have developed in Australian Family Law which accord to the Lodder-Zeleznikow process.

Developing BATNAs and the Split Up system

As Lodder and Zeleznikow (2005) noted, it is important that disputants be aware of the likely outcome of a dispute if a judicial decision is made. Split-Up provides advice on property distribution following divorce (Zeleznikow 2004). In developing Split-Up, Australian Family Law experts were used to identify factors pertinent to a property distribution following divorce. A data set of past cases was then fed to machine-learning programs. Thus, Split-Up learned the way in which judges weighed factors in past cases, without resorting to developing rules.

In the Split-Up system, the relevant variables were structured as data and claim items in 35 separate arguments. The claim items of some arguments were the data items of others, resulting in a tree that culminated in the ultimate claim that indicated the percentage split of assets a judge would likely to award the husband. The tree of variables is illustrated in the following figure.

[17] Family Dispute Resolution is now essentially compulsory in Australian Family Law. People who wish to resolve parenting matters are required to attend Family Dispute Resolution and make a genuine effort to resolve issues, before they progress through the court system. Situations involving family violence, child abuse or extremely urgent matters are exempt from Family Dispute Resolution.



In 15 of the 35 arguments, claim values were inferred from data items with the use of heuristics, whereas machine learning (in the form of neural networks) was used to infer claim values in the remaining 20 arguments. The neural networks were trained with data from only 103 commonplace cases[18].

In consultation with domain experts, 94 variables were identified as relevant for the determination of a percentage split of the common pool. The way the factors combine was not elicited from experts as rules or complex formulas. Rather, values on the 94 variables were extracted from cases previously decided, so that a neural network could learn to mimic the way in which judges had combined variables. The relevant variables were structured as separate arguments following the argument structure advanced by Toulmin (1958).

Split-Up can be used to determine one's BATNA. It first shows both litigants what they would be expected to be awarded by a court if their relative claims were accepted. It gives them relevant advice as to what would happen if some or all of their claims were rejected. Users are able to have dialogues with the Split-Up system about hypothetical situations and learn about the strengths and weakness of their claims.

Suppose the disputants' goals are entered into the system to determine the asset distributions for both W and H in a hypothetical example. For the example taken from Bellucci and Zeleznikow (2001), the Split-Up system provided the following answers as to the percentages of the marital assets received by each party:

		W's %	*H's %*
Given one accepts W's beliefs		*65*	*35*
Given one accepts H's beliefs		*42*	*58*
Given one accepts H's beliefs except for giving W primary care of the children		*60*	*40*

[18] A commonplace case is one that does not provide any lessons by itself (as opposed to landmark cases), but together with numerous like cases can be used to derive conclusions.

Clearly primary care of the children is very significant in determining the husband's property distribution. If he were unlikely to win this issue, the husband would be well advised to accept 40% of the common pool (otherwise he would also risk paying large legal fees and having ongoing conflict).

Developing Trade-offs - the Asset Divider system

Traditional negotiation decision support has focused upon providing users with decision support on how they might best obtain their goals. Such advice is often based on Nash's principles of optimal negotiation or bargaining (Nash 1953). Family_Winner (Bellucci and Zeleznikow 2006) takes a common pool of items and distributes them between two parties based on the value of associated ratings.

Each item is listed with two ratings (a rating is posted by each party), which signify the item's importance to the party. The algorithm to determine which items are allocated to whom works on the premise that each parties' ratings sum to 100; thereby forcing parties to set priorities. The basic premise of the system is that it allocates items based on whoever values them more.

Originally, the system was developed to meet clients' interests, with no concern for legal obligations. But as noted below, in Zeleznikow (2014), we incorporated principles of justice into the Asset-Divider system.

Walton and Mckersie (1965) propose that negotiation processes can be classified as distributive or integrative. In distributive approaches, the problems are seen as *zero sum* and resources are imagined as fixed: *divide the pie*. In integrative approaches, problems are seen as having more potential solutions than are immediately obvious and the goal is to *expand the pie* before dividing it. Parties attempt to accommodate as many interests of each of the parties as possible, leading to the so-called *win-win* or *all gain* approach.

Walton and McKersie's work and the game theory research of John Nash led to a significant use of game theory to support negotiation in industrial relations. Game theory is particularly applicable in countries were employers and employees can bargain with very few restrictions.

When evaluating the Family_Winner system, Bellucci and Zeleznikow (2006) were made aware of the limitations of using integrative negotiation for providing family mediation decision support. While both the evaluating solicitors and mediators were very impressed with the way Family_Winner suggested trade-offs and compromises, they had one major concern — that in focusing upon negotiation, the system had ignored the issues of justice. For example, Australian Family Law is based upon the paramount needs of the children rather than the interests of the parents. Thus, a fair decision meets the needs of the children.

The AssetDivider system (Abrahams et al 2012) incorporates the basis of Family_Winner's allocation and trade-off strategy to decide upon the allocation of assets based on interests and an item's monetary value. In a family property dispute one party may have a high emotional attachment to a record collection which has a minimal financial value.

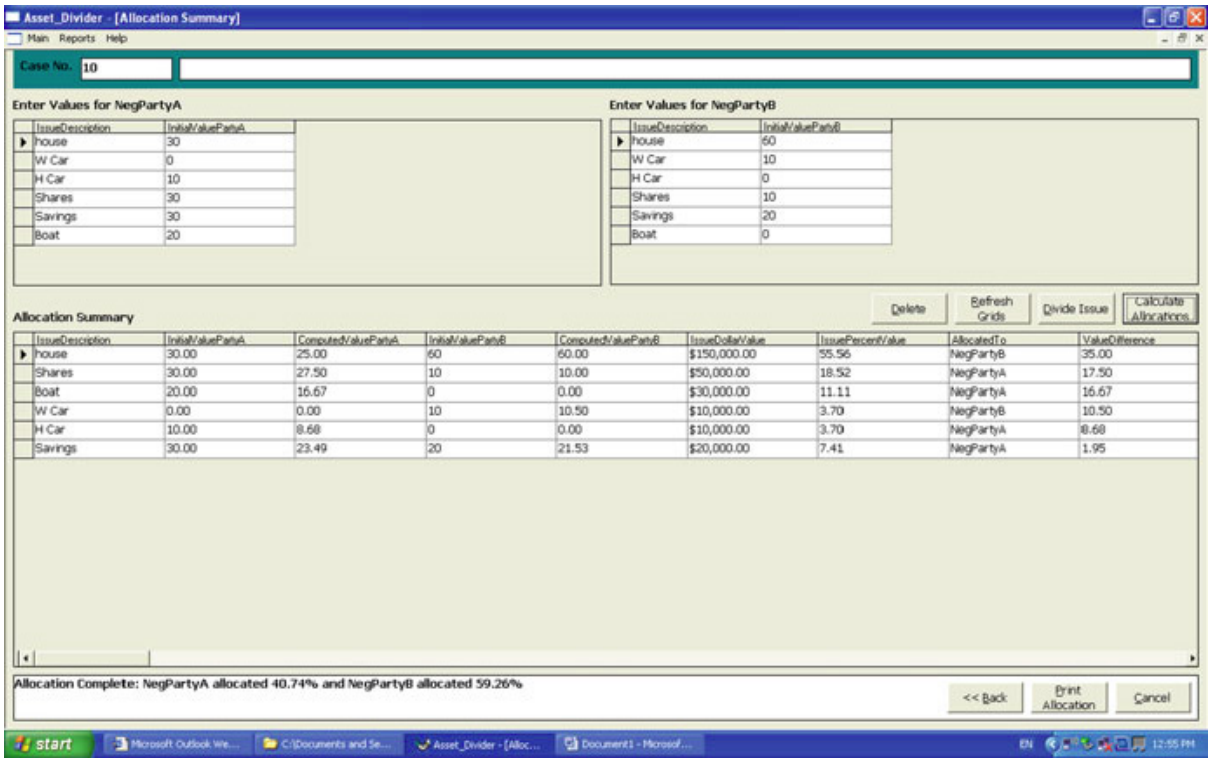
AssetDivider accepts a list of items together with ratings (two per item) to indicate the item's importance to a party. In addition, it also accepts the current monetary value of each item in dispute. It is assumed that this dollar value has been negotiated (if necessary) before AssetDivider is used. Hence, only one-dollar value is entered per item. The proposed percentage split is also entered; this reflects what percentage of the common pool each party is likely to receive in the settlement.

AssetDivider's output consists of a list of items allocated to each party. All of the items (except one) on the allocation lists are provided in the intake screen by the disputants. The additional item is a "payout" item, which reflects the amount of money a disputant would need to pay the other party for the items they have been allocated. AssetDivider's allocation strategy works by allocating an item to the party whose rating is the highest i.e. to parties according to whoever values them the most. It then checks the dollar value of items it has been allocated previously (that is, their current list of items), the dollar value of the item presently allocated and the dollar amount permitted under the percentage split given by mediators. If by allocating the item in question the party exceeds its permitted amount, the item is removed from its allocation list and placed back into negotiation. In this case, the item has not been allocated to a party. If the dollar value of the item was within the limits of the amount permitted under the percentage split rule, then the allocation proceeds.

Once an item has been allocated to a party, the remaining ratings (of items still in dispute) are modified by trade-off equations. These modifications try to mimic the effect losing or gaining an item will have on the rest of the items still in dispute.

The equations directly modify ratings by comparing each one against that of the item recently lost or won (each party's set of ratings are modified as a result of an allocation). The equations update ratings based on a number of variables—whether the item allocated was lost or gained, the value of the allocated item in relation to items still in dispute and the value of the item whose rating will change as a result. Only the 'losing party' in AssetDivider is compensated by the trade-off equations modifying.

An example of Asset Divider's output (Zeleznikow 2014) is:



By supporting parties to engage in trade-offs, the system helps resolve complex conflicts.

Providing Communication – The Australian Online Family Dispute Resolution System

The third part of an online dispute resolution process is supporting parties to communicate with each other, often via video conferencing.

Much ODR has tried to emulate face-to-face ADR (Bellucci et al 2010) rather than use the additional facilities offered by the development of the World Wide Web. For example, Thomson (2011) explains how the Australian Online Family Dispute Resolution emulates the services provided by Dispute Resolution practitioners based at 65 Family Relationship Centres. The designers assumed that traditional face-to-face mediation would work best in the online environment.

Features successfully integrated into the technology include:

- video streaming so that each participant can safely see and communicate with the other;
- screen features including small windows (pods) which can be scaled, resized and repositioned and hold a variety of information;
- visual sharing of information, including document sharing, online demonstration and whiteboard feature;
- ability to record notes which can subsequently be emailed to the Family Dispute Resolution Practitioner (FDRP); and
- secure access to functionalities via FDRP authorization.

Prior to commencement of the service, a toolkit was developed to help determine user (FDRP) competence and site (technical) readiness, and this informed further training and site preparation. Training in the use of the technology and in the development of practice skills required to successfully deliver the service was provided to individuals and to staff in group settings. However, little thought was given to when and where users would interact with the system. Because of this

and even though there are substantial delays in receiving a mediation at a Family Relationship Centre, and no delay using the online system, there has been minimal uptake of the online system.

As well as advice upon trade-offs and optimal solution and systems that calculate BATNAs, important background information can be offered via the internet. These might include textbooks and videos outlining the mediation process. In family disputes, there might be background information on child psychology and the welfare of children as well as model parenting plans.

6. Conclusion

In this article, we have examined the issue as to whether potential litigants can receive useful support from intelligent online dispute resolutions. We have seen that such systems can be particularly useful for self-represented litigants. The SRLs benefit not only from obtaining useful advice, but also becoming better educated about the procedures and potential outcomes for issues in dispute. We note that most ODR systems provide exactly one of either BATNA advice, support for trade-offs and facilitated communication. A truly useful Online Dispute Resolution system should be a hybrid of all three approaches.

Further, Online Dispute Resolution should not be fully automated. As well as providing opportunities for communication, such systems should advise users of the relevant law, potential solutions and relevant trade-offs. Useful tools might be videos, relevant papers and books, past cases and links to useful websites. They can also be very useful in triaging disputes (e.g. immediately sending a case of domestic violence to court rather than allowing the parties to prolong physically acrimonious disputes) and act as a source of information collection (there is no need to expend court official's time recording demographic data).

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