Algorithmic Dispute Resolution

The automation of professional dispute resolution using AI and Blockchain technologies

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ABSTRACT

Legal Services industries are entering a period of major disruption caused by new legal technologies (LawTech), such as artificial intelligence (AI), Internet of Things (IoT) and Blockchain. An area already undergoing major innovation is alternative dispute resolution [1], especially automated online dispute resolution [2, 3].

In terms of LawTech, we broadly divide online dispute resolution into: a) *Consumer ODR* – uses technology to facilitate the resolution of disputes between ecommerce parties, typically online suppliers and consumers; b) *Judicial ODR* – covers any means of settling 'ordinary' disputes where there is a hearing (using technology) but outside of the courtroom, such as divorce or personal injury cases; and what we refer to as c) *Corporate ODR* – the use of technology to manage the resolution of any contractual disputes that may emerge from major multi-partner projects or financial transactions.

This paper focuses on ODR and specifically the future use of automating anticipatory Corporate dispute resolution using artificial intelligence and blockchain technologies. The paper describes the legal sector, and how it is being radically transformed by computer science.

1. Introduction

In 1868 William Gladstone said in a speech 'Justice Delayed is Justice Denied', a theme that still is the main preconception of judges, court administrators and the public. Delay is an issue in courts around the world, for example in India in 2015 it was estimated that there are 21.3 million cases pending, with a newspaper article commenting that 'if the nations judges attacked their backlog nonstop with no breaks for eating or sleeping and closed 100 cases per hour it would take more than 35 years to catch up.

Although the law is steeped in tradition, three recent trends can be identified that have the potential to bring about substantial change:

   a) The Legal sector has witnessed a growth in the use of 'LawTech' or 'LegalTech' technology both in the office and in courts. LawTech refers to the use of technology and software to provide legal services where advice is given both before the transaction commences and after disputes break out. This refers to the application of technology and software to help law firms with practice management, documents, storage, billing, accounting and electronic discovery. It also includes connecting people with lawyers more efficiently through online marketplaces and lawyer matching websites.

   b) Parties are now increasingly turning to Alternative Dispute Resolution (ADR). Traditionally disputes are resolved by resorting to Law, where cases are resolved by Judges who decide the case according to the law in the particular jurisdiction where the dispute occurred or is regulated. Increasingly, parties are resorting to ADR procedures consisting of negotiation, mediation or arbitration, which can be human or LawTech based.

   c) Private and judicial Online dispute resolution (ODR) platforms now resolve millions of consumer disputes and the courts are increasingly looking towards online and arbitrated dispute resolution to provide speedy and efficient access to justice in a formal environment.

Clients may consult lawyers before transactions are entered into or after the dispute has arisen; but use technology to facilitate the resolution of disputes between parties, such as online suppliers and consumers.

Legal Technology

Legal technology, legal tech or more recently LawTech [4] traditionally refers to the application of technology and software to help law firms with practice management, etc. Traditional areas of Legal Tech include: practice management, document storage, billing, accounting, electronic discovery (e.g. Recommind), legal research (e.g. LexisNexis and Westlaw) and document automation/assembly.

More recent areas of growth in LawTech focus on: providing tools or a marketplace to connect clients with lawyers (e.g. UpCounsel); providing tools for obviating the need for a lawyer (e.g. LegalZoom, RocketLawyer); automation of legal writing or aspects other substantive aspects of legal practice; platforms for document preparation in lieu of a lawyer, such as Will writing (e.g. WillJini) or immigration applications (e.g. RapidVisa, LegalJini) (see www.cbinsights.com/blog/legal-tech-market-map-company-list/).

Online Dispute Resolution

ODR [2] uses technology to facilitate the resolution of disputes between parties; involving negotiation, mediation or arbitration, or a combination of all three; and can be fully automated or involve human intervention. In ODR, automation is used both <u>in the process</u> of bringing the parties together for a 'neutral' decision or to propose a settlement; <u>in the resolution</u> i.e. as the 'Fourth Party'; or can be <u>mandatory</u>.

These elements of ODR are summarised in Table 1.

	Negotiation		Mediation		Arbitration	
	Full-automated	Human-assisted	Full-automated	Human-assisted	Full-automated	Human-assisted
Process						
Consumer ODR	✓		✓			
Judicial ODR	✓		✓		✓	
Corporate ODR	✓		✓		✓	
Resolution						
Consumer ODR		✓		✓	✓	
Judicial ODR	✓	✓	✓	✓		✓
Corporate ODR	✓		✓		✓	✓
Mandatory						
Consumer ODR						
Judicial ODR						✓
Corporate ODR	✓		✓		✓	✓

Table 1: Online Dispute Resolution

In ODR, as discussed, <u>Disputes</u> can be categorised into either *anticipatory disputes,* usually contractual*,* where the use of ADR in the event of a disagreement is mandatory, (for example the contract is governed by UK law or a clause in a Premier League football contract which appoints the court for arbitration in sport in Geneva as the venue for resolution of any litigation); *post hoc disputes,* usually tortious, where there is a voluntary decision to litigate after the dispute as arisen, or the parties agree to ADR for example by the appointment of a mediation service such as Centre for Effective Dispute Resolution (CEDR).

Another important issue in Law is <u>Discovery;</u> the process where the parties exchange documents which often becomes the main battleground in litigation or ADR. E-discovery has become a major

sector, especially in the USA. Speeding up the exchange of documents by automation will considerably speed up the entire process and generate considerable savings in legal costs.

2.   Resolution of Disputes
Next we discuss the difference between litigation as opposed to ADR.

2.1   Litigation versus ADR
Litigation is the process where traditionally civil disputes are dealt with by the Courts. In the UK, approximately 1.4 million civil claims and petitions are brought in the County Courts, with more serious cases being heard in the High Court. Typically, only about 3%–4% of cases settle without the need for a hearing. Delays often take place, with the average time taken from the case being submitted to court to conclusion of 59 weeks [5].

ADR [1] is designed to resolve disputes without going to court. The common forms of ADR are:

- **Negotiation -** often lies at the centre of conventional ADR, where the mediator aims to build a dialogue between the parties where trust has broken down. The goal is the 'win win', whereby the parties abandon their entrenched positions and attempt to move forward in a manner which is viewed as constructive to both parties. Divorce cases being an example.

- **Mediation** - where an independent third party attempts to build a dialogue with a view to negotiating a settlement. Once an agreement is reached it is reduced to writing and becomes a binding contract. In many ways, Mediation is the polar opposite of conventional litigation or arbitration, where there is generally a winner and a loser, and the loser bears the entire costs of the process.

- **Arbitration** - where the parties submit the case to an unbiased third person designated by the parties who agree in advance to comply with the findings and then participate in a hearing where both sides can present evidence. The arbitrators' decision is governed by a country's arbitration laws or the arbitration rules prescribed by an international organisation.

- **Early Neutral Evaluation -** where a 'neutral' person, often a retired Judge, hears a summary of each parties' case and gives a non-binding assessment of the merits. This can be used as a basis for settlement or further negotiation.

- **Adjudication -** is a contractual or statutory procedure for a swift interim dispute resolution, provided by a third party adjudicator and is often subject to a strict timetable. Based on a binding ruling that can include provision for costs, the whole process can take 28 days.

2.2   Exchange of documents
An important concept in law is 'discovery'; amenable to technologies such as AI, IoT and blockchain. Discovery is the pre-trial stage in litigation where each party can request documents and other evidence from other parties [6]. Inspection is also dealt with in the rules which set out a 'Duty of Search. Parties can object to an order on the basis that there is legal privilege or there would be damage to the public interest.

Discovery is often the main battleground in complex litigation and is one of the most expensive and time consuming aspects of pre-trial preparation. As parties now hold information in digital form, there has been a significant development of the law of discovery concerning electronic documents, which is beyond the scope of this paper. In law, there is a wide definition of Electronic Document with Parties having to agree which search terms are to be applied to their material and run those searches over their own material. An Electronics Documents Questionnaire is used, and the court will rule if there is no agreement on what should be disclosed [7].

2.3 Virtual Courts

For years, as discussed, judges and court administrators have struggled to get cases quickly into court where they can be resolved. Categorising disputes into court divisions where specific rules can be designed, and specialist judges appointed with experience in the particular type of case has been the general approach of judicial systems struggling to 'speed up justice'. Devices that are being used are 'LawTech' and the extension of ADR to formal cases.

An early solution was the introduction of 'the virtual court'. Fredrick I Lederer wrote:

'The Courtroom is a place of adjudication, but it is also an information hub. Outside information is assembled, sorted and brought into the courtroom for presentation.. The courtroom is thus the centre of a complex system of information exchange and management [7].

Twenty years later, the UK modernisation programme has seen the introduction of WiFi and the Crown Court Digital Case System [8] and a new proposal by the Civil Justice Council, headed by Richard Susskind [9] to establish a Court based Online Dispute Resolution service known as HMOC (see 5.1 below). Apart from saving the cost of printing out documents, these initiatives seldom speed up the trial process as the parties now have access to more material. Courts and tribunals are increasingly dealing with technology, for example with criminal cases concentrating on evidence from Facebook, CCTV, Mobile Telephones and emails held on servers. As we discuss below, little consideration is currently being given to using the new technologies to resolve the most complex and international disputes.

2.4 Growth of ADR

Alternative Dispute Resolution is any process that avoids the necessity of issuing proceedings in a formal court setting to resolve the issue between the parties.

In the UK, there are a number of well-established ADR schemes in regulated sectors, including financial services, energy and telecoms. Outside these sectors, many businesses are already members of voluntary ADR schemes [10]. In certain sectors, the regulators (e.g. Ofgem, FCA, CAA) act as the generic competent authority, in others the Secretary of State for Business, Energy & Industrial Strategy (BEIS) has appointed the Chartered Trading Standards Institute to carry out the functions on his behalf.

More complex disputes often have prescribed routes which have been designed over a number of years, with the intention of speeding up the pre-hearing process, as administrators and Judges have struggled to encourage the parties to move away from conventional litigation. These routes can be used to build domain specific ontologies, which are an essential step in the automation of discovery.

There has been a proliferation of domain specific private arbitration services around the world, as regulators and other trade organisations attempt to enable certainty, speed and efficiency to the resolution of disputes that arise from the particular circumstances of each market sector. For example, sports disputes can be resolved by the Court of Arbitration for Sports, headquartered in Lausanne (Switzerland), with courts in New York City, Sydney and Lausanne. Temporary courts are established in current Olympic host cities. Another example is the World Intellectual Property Organisation (WIPO) Arbitration and Mediation Center.

3. LawTech

LawTech (cf. FinTech) has evolved to be associated more with technology and start-ups disrupting the practice of legal services: a) by providing lawyers with technology to help support them in their professional work; or b) by giving people access to online platforms that reduces or in some cases eliminates the need to consult a lawyer, or by connecting people with lawyers more efficiently through online marketplaces and lawyer-matching websites.

The underlying technologies can be used to address both aspects of the 'legal advice', and will also be of increasing value to the growth of litigation funding that has occurred in the UK, Australia, USA, Singapore and Hong Kong.

The core technologies are:

- **Artificial Intelligence (AI)** - systems able to perform tasks normally requiring human intelligence.

- **Internet of Things (IoT)** - is the inter-networking of 'smart' physical devices, vehicles, buildings, etc. that enable these objects to collect and exchange data.

- **Big Data Analytics** – the analysis of large and varied data sets to uncover hidden patterns, unknown correlations, customer preferences etc. to help make informed decisions

- **Blockchain Technologies** - technology underpinning digital currencies and transactions that secures, validates and processes transactional data.

Underlying LawTech and ODR are AI and blockchain. For completeness we briefly summarise AI and Blockchain technologies.

3.1 Artificial Intelligence Technologies

As we know, artificial intelligence (AI) provides computers with the ability to make decisions and learn without explicit programming. There are two main branches:

- **Knowledge-based systems (KBS)** – are computer programs that reason, and knowledge is explicitly represented as ontologies or rules rather than implicitly via code. KBS can be subdivided into:
  - *Rule-based systems* – is one whose knowledge base contains the domain knowledge coded in the form of IF-THEN or IF-THEN-ELSE rules.
  - *Case-based Reasoning* - a form of so-called expert systems that bases decision-making on prior case experience, instead of on a pre-defined rule set.

- **Machine Learning** - is a type of AI program with the ability to learn without explicit programming, and can change when exposed to new data. Subdivisions include:
  - *Supervised learning* - is the task of inferring a function from labelled training data, where training data consist of a set of training examples*.*
  - *Unsupervised learning* - is the task of inferring a function to describe hidden structure from unlabelled data.

Other AI technologies important for legal services include natural language processing (NLP) and sentiment analysis:

- **Natural language processing (NLP)** – the application of computational techniques to the analysis and synthesis of natural language and speech.

- **Sentiment analysis** - the process of computationally identifying and categorizing opinions expressed in a piece of text.

Recent developments have been made, principally in France in **Predictive** or **Quantitative Justice** where assessments are made of probability for success/failure, strategy and outcome before a particular tribunal.

3.2 Blockchain Technologies

Elements of blockchain technology originally conceived for Bitcoin and other cryptocurrencies are now recognized to have far-reaching potential in other areas. Blockchains are a way to order transactions in a distributed ledger, a record of consensus with a cryptographic audit trail maintained and validated by multiple nodes. Blockchain technology allows many distrusting parties to converge on a common protocol that can track assets in a dynamic fashion. Using this technology, many processes and third-party solutions are streamlined or collapsed entirely.

The core technologies are:

- **Distributed Ledger (DL)** – a decentralized database where transactions are kept in a shared, replicated, synchronized, distributed bookkeeping record, which is secured by cryptographic sealing. The key distinction between 'distributed ledgers' and 'distributed databases' is that nodes of the distributed ledger cannot/do not trust other nodes – and so must independently verify transactions before applying them.

- **Smart Contracts** - are simply the rules that participants have collectively signed up to that govern the evolution of the 'facts' in the distributed ledger. Possibly computer programs that attempt to codify transactions and contracts with the intent that the records managed by the distributed ledger are authoritative with respect to the existence, status and evolution of the underlying legal agreements they represent.

For many blockchains the key attributes are: a) *Resilience* – blockchains operate as decentralized networks as opposed to a central server with a single point of failure; b) *Integrity* – blockchains operate using distributed open-source protocols removing the need to trust a third party for execution; c) *Transparency* – public blockchains have inherent transparency features, since all changes are visible by all parties; and d) *Unchangeable* – records in a distributed public blockchain are largely 'immutable', allowing applications and users to operate with a good degree of confidence. In general, the key interesting property is the creation of systems that assure that a group of untrusting parties all have accurate and identical records. Blockchain removes the need to have a trusted third party, for example by acting as custodian or escrow agent for records or assets and thereby creating transparency.

3.3 Argumentation

Another influential technology is 'argumentation' [11]. In artificial intelligence and related fields, argumentation is a way of dealing with contentious information and draws conclusions from it. Interestingly argumentation is used in law, for example in trials, in preparing an argument to be presented to a court, and in testing the validity of certain kinds of evidence.

Efforts have been made within the field of artificial intelligence to perform and analyse the act of argumentation with computers. Computational argumentation systems have found particular application in domains where formal logic and classical decision theory are unable to capture the richness of reasoning, domains such as law and medicine.

Proponents of ODR speak of the technology being the trusted 4th *party*. For example, the combination of key attributes as set out above allows blockchain to introduce trust to all transactions and is therefore viewed as integral to any algorithmic dispute resolution platform.

Next we look at the three principal areas of automated dispute resolution where algorithms are used in various stages of the process (see Table 2).

	Negotiation		Mediation		Arbitration	
	Full-automated	Human-assisted	Full-automated	Human-assisted	Full-automated	Human-assisted
Consumer ODR						
EU ODR Platform	✓		✓	✓		✓
eBay Res Center		✓		✓		
Mondria	✓		✓			
SmartSettle	✓		✓			
Judicial ODR						
VirtualCourtHouse		✓	✓	✓		✓
CyberSettle	✓		✓			
Corporate ODR						
'future system'	✓		✓		✓	

Table 2: Online Dispute Resolution Services examples

4.   Consumer ODR

A good source of information on Consumer ODR is the book 'Digital Justice', by the pioneers of Consumer ODR Ethan Katsh [12]. They review the technology that is now required to resolve problems from the 'on demand' economy; such as being harassed on Twitter, or having a negative review on Airbnb.

The use of ODR for resolving consumer disputes, especially ecommerce, is now well established; to the extent that both the European Union EU [13] and the United Nations Commission on International Trade [14] have been trying to facilitate the adoption of cross border ODR systems.

4.1   Description

A Consumer ODR platform, as defined by the European Union (EU), is an interactive website offering a single point of entry to consumers and traders seeking to resolve disputes out-of-court which have arisen from online transactions [13] allowing consumers and traders to submit complaints by filling in an electronic complaint form and to attaching relevant documents, transmit complaints to an ADR entity competent to deal with the dispute concerned, and offer an electronic case management tool.

Examples include the governmental EU ODR platform [13], and the commercial eBay Resolution Center, described below.

Some ODR platforms use electronic negotiation, which is the process whereby two or more parties multilaterally bargain resources of mutual intended gain, using intelligent software. Real world and electronic negotiation do not require the parties to reach a negotiated agreement. An agent can choose 'no deal' if it cannot negotiate a satisfactory agreement and are therefore not mandatory. Marketplaces can be 'closed', based on a predefined set of users who enrol in the marketplace and agree to a set of rules. An open marketplace has no such agreement: agents are welcome to enter and exit at any time and are required to agree to no rules [15].

4.2   Technology

There are a growing number of ODR platforms:

- **EU Consumer ODR Platform** - a web-based platform developed by the European Commission to help consumers and traders resolve their contractual disputes about online purchases of goods and services out-of-court at a low cost in a simple and fast way [13].

- **eBay Resolution Center** – the Resolution Center resolves disputes between ecommerce parties. The first eBay ODR service was built for eBay by SquareTrade in the mid 1990s for resolving e-commerce disputes.

- **Modria.com** – Tyler Technologies' Modria, a spin-off from the ODR departments of eBay and PayPal, provides a cloud-based platform on which businesses and public bodies can customize and build their own ODR services. It supports various ODR methods, including diagnosis, negotiation, mediation, and arbitration, and also offers a configurable case management and workflow system that handles case intake, document generation and management, scheduling, reporting, and status messaging.

- **Cybersettle** - this platform provided a 'blind bidding' resolution service (but has currently suspended trading due patent case). The claimant and defendant each submit the highest and lowest settlement figures that would be acceptable to them. Cybersettle handled over 200,000 claims of combined value in excess of $1.6 billion with substantial savings in time, costs and an average reduction of settlement time of 85%.

- **WeClaim** - is a partially automated dispute resolution system, launched in France, to help individuals to make small claims and to join class actions. It has settled over 1,000 claims and has 4,000 outstanding, taking a 25% success fee.

4.3   Case Study

The best known Consumer ODR service is eBay, which resolves 60 million disagreements every year. eBay offers two services: a free web-based forum which allows users to attempt to resolve their differences on their own or if necessary, the use of a professional (human) mediator.

Initially, disputes were resolved by mediators working online in remote locations, but it soon became clear that the cost of provision of such a service could not be justified in view of the low value of the items that were subject of the cases.

The resolution of disputes over non-payment or complaints that the goods did not match the description are encouraged to be resolved by the parties themselves by negotiation, with practical advice offered how to avoid misunderstandings and avoid proliferation of the dispute. If this does not work, the parties present their argument to a member of staff who issue a binding outcome under the Money Back Guarantee.

eBay offers to review information provide within 48 hours, refund non deliveries in full using PayPal, assist with returns, provided this form of payment was used for the purchase. In addition, disputes about feedback are now dealt with by trained independent neutrals.
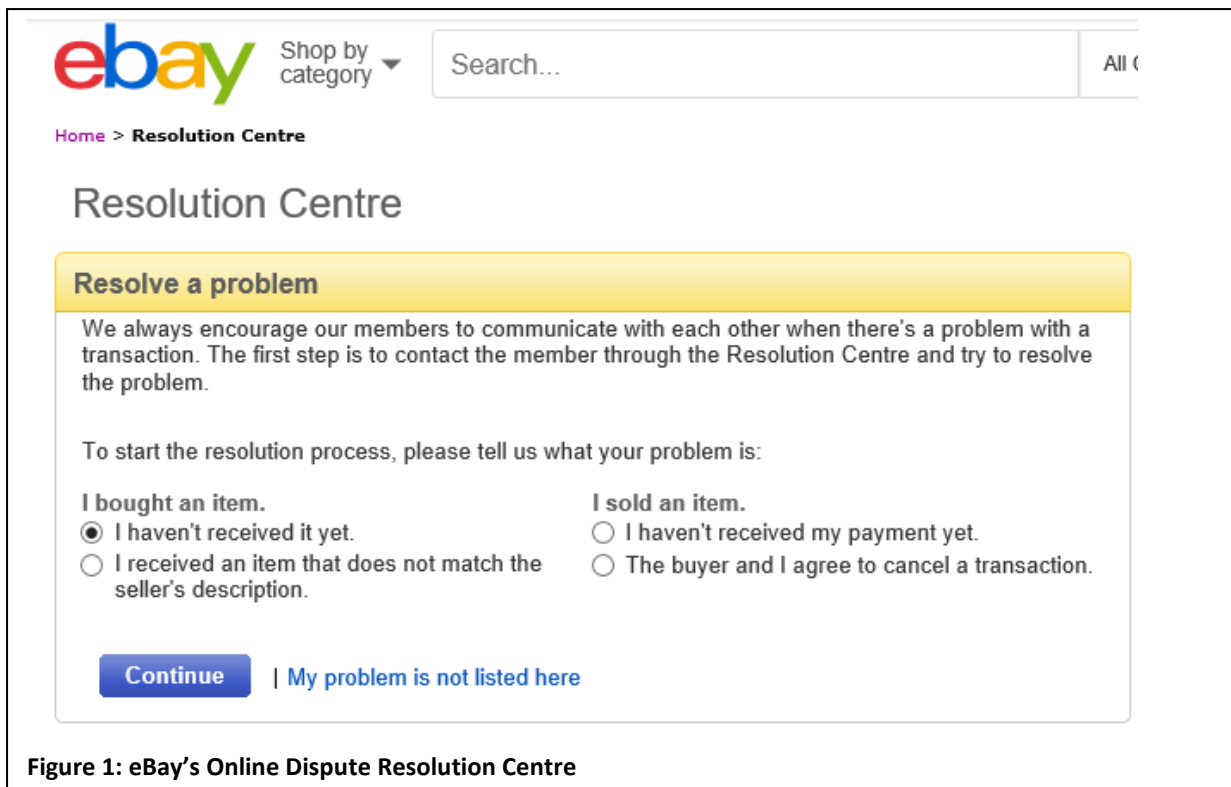
Figure 1: eBay's Online Dispute Resolution Centre

5. Judicial ODR

As discussed, we use the term Judicial ODR for arbitrated dispute resolution used to settle 'ordinary' judicial disputes where there is a hearing (using technology) but outside of the courtroom, particularly in personal injury, healthcare, social media, employment and family law, where a neutral 3rd party resolves the dispute.

5.1 Description

Katsh [3] described judicial technology as the *4th Party* in what has now become an accepted metaphor in the legal profession. Automation is used both in the process of bringing the parties together for a 'neutral' to decide the case or propose a settlement and in the resolution of the dispute by actually producing a settlement decision or recommendation.

5.2 Technology

Judicial ODR technology subdivides into online judicial services and commercial service providers. Example services are:

- **Money Claim Online** (MCOL) - is the UK HM Courts & Tribunals Service Internet based service for claimants and defendants.

- **VirtualCourtHouse** - disputing parties can choose from a directory listing over 300 neutrals, ranging from family mediators to construction arbitrators, and retired judges, who mediate the dispute or render an arbitral award (www.virtualcourthouse.com).

- **SmartSettle** – applies techniques from game theory to resolve disputes. Uses a six process, supported by a facilitator: a) the process is explained and parties agree to the guidelines, b) parties identify interests in dispute, c) the demand and value are rated by both parties, d) software proposes settlement, e) software optimises settlement based on negotiation and f) the parties sign the framework agreement (www.smartsettle.com).

- **Rechtwijzer 2.0** - Rechtwijzer (Netherlands)/MyLawBC (British Columbia) is an ODR system for divorce and separation, landlord-tenant disputes and employment disputes etc.

5.3 Case Study

VirtualCourthouse has an extensive network of 'neutrals' - mediators, arbitrators - many of whom are retired judges, experienced lawyers, industry experts and leading authorities in their respective fields who offer a wide range of services.

A full virtual hearing for participants in remote locations, by **IOCOM Visimeet**, the leading multi-party video system based on the Access Grid, originally used by universities around the world to build virtual research groups. Using a virtual 'room system' which is ideal for mediations, parties only come together for plenary sessions. Designed for upwards of 20 participants, with documents appearing in side windows, chat between parties is allowed (as would happen in a real courtroom). Sessions are recorded. Large scale installations are made with projections of all windows played on a large wall, with sound built into the ceiling and multi-projector points to recreate a live meeting in a virtual environment.
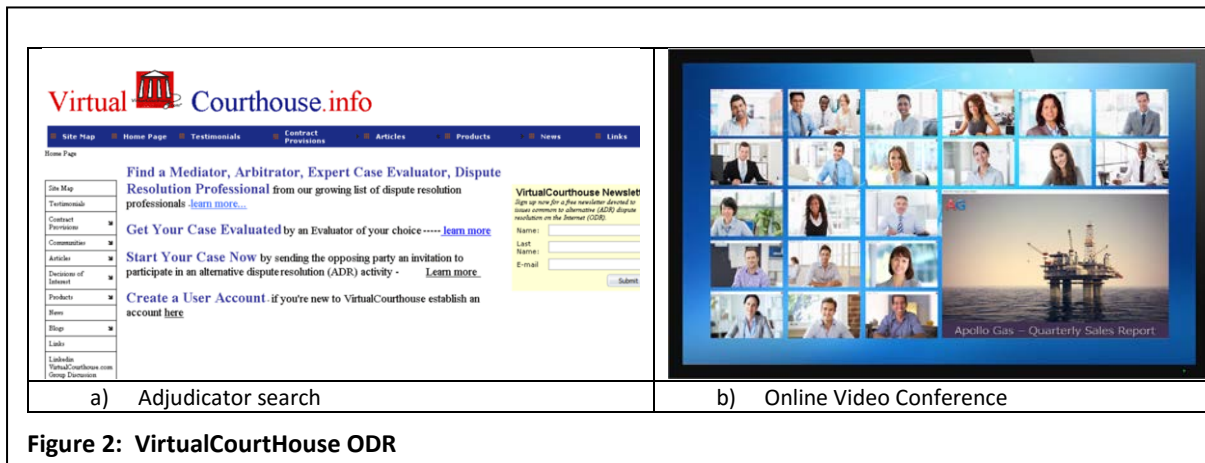

a) Adjudicator search	b) Online Video Conference

Figure 2: VirtualCourtHouse ODR

Virtual Courthouse also uses other devices to replicate techniques used in ADR, for example virtual whiteboards, rules of the various processes and standard mediation and arbitration agreement templates for use when a case settles.

6.   Corporate ODR

In the words of Colin Rule (founder of Modria) 'Where there's commerce, there's conflict' [16]. Although IT-enabled (corporate) dispute resolution was proposed by Barnett [17], Corporate ODR to manage the resolution of major multi-partner projects or financial contractual disputes is only now starting to emerge.

6.1   Description

The core principle in a Corporate ODR system or service is that parties engaged in a major commercial project should agree before commencement of the project that any disputes will be referred to the system in the first instance. This can be viewed as a natural progression to existing professional sector-specific ADR services.

For example, authenticity and provenance is often an issue in any litigation. However, now blockchain distributed ledgers can be used to build a trusted, domain specific, document repository. Further, the knowledge that material is now likely to be disclosed may encourage parties to a transaction to adopt a more 'honest' approach to that transaction.

Next the mediation algorithm does not decide who is right and who is wrong, or where the truth lies, but reduces the conflict into areas of consensus, to find a 'win win'. ODR mediators **assess the needs and interests** of each party then seek to discover the 'best/worst alternative to a negotiated agreement (BATNA/WATNA) [18]. The use of BATNAs and WATNAs was considered to manage disputes in labour disputes that arose through contracting by software agents. It is proposed that AI technologies and blockchain DLT can be used to help parties to a dispute establish their own BATNA and WATNA.

6.2   Technology

We will now outline a possible structure of a Corporate ODR system, designed to resolve disputes between major contracting partners (see Figure 3.).

The starting point is the contracting partners' <u>agreement</u> to use an automated ODR system, based on smart contract technology. All documents related to the collaboration will be <u>filed</u> in a blockchain distributed ledger repository, which both supports the collaboration and is available for legal <u>discovery</u> should a dispute arise.

In cases where 'there is a need for speed' such as in international construction contracts where time is of the essence, it is envisaged that the parties will be prepared to consider an automated <u>dispute resolution</u> which provides a 'win win' rather than risk the cost, delay and uncertainty of a conventional <u>court</u> trial before a Judge. The process is designed to manage the contract documentation at the time of the contract rather than at the time of the dispute.

Figure 3: Corporate ODR System
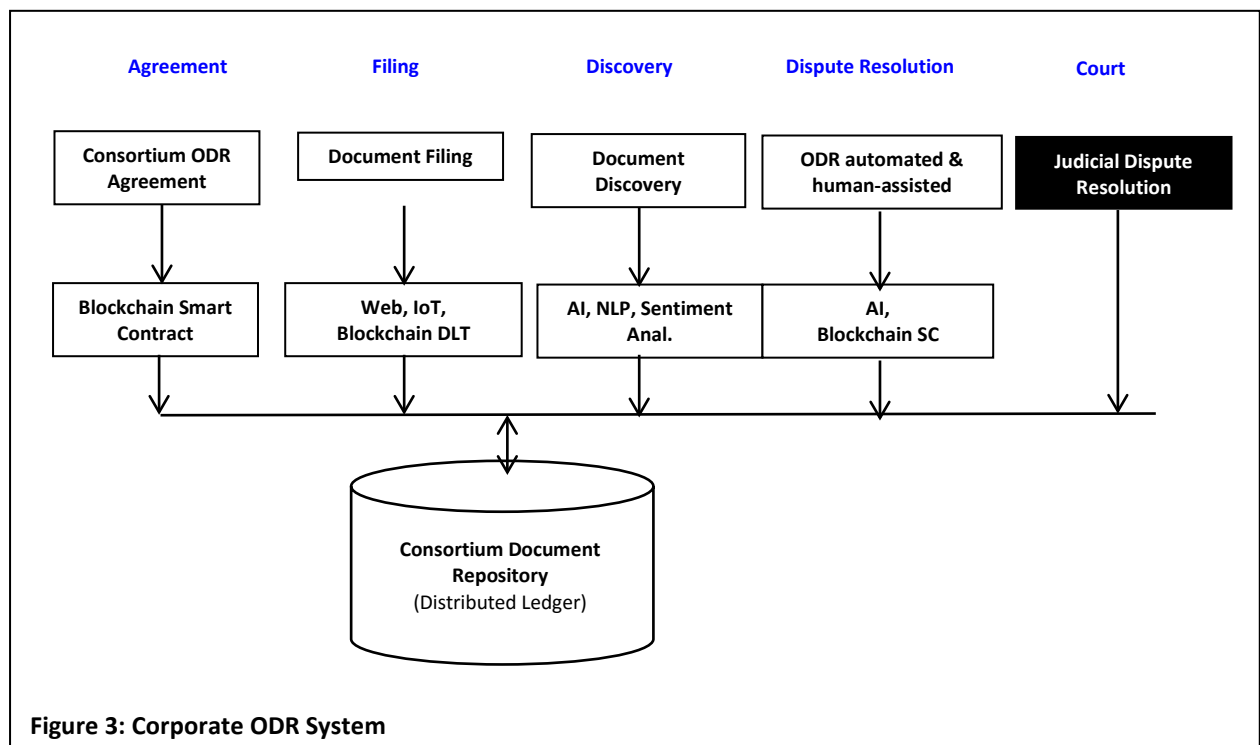
6.3   Case Study: Construction Disputes

A fertile area for the use of Corporate ODR is the Construction sector, given the propensity for litigation in construction disputes. In addition, the industry is transitioning to the digital Building Information Modelling (BIM) [19]; a digital representation of physical and functional characteristics of a facility. A 'BIM' is a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle; defined as existing from earliest conception to demolition. BIM

and disruptive digital technologies such as AI and especially blockchain are highly complementary; and a natural fit with Corporate ODR.

Pertinent is the potential automation of the UK Joint Contracts Tribunal (JCT) formed by the Royal Institute of British Architects in 1931, when the first standard building contract was issued. The JCT now produces a range of contracts including Major Projects, Major Works, Design and Build, Construction Management and Prime-In-Cost Building Contracts. The Chartered Institute of Arbitrators also has a 'catch all' dispute resolution clause which is often used in construction contracts. Many contracts for large and complex projects, now have, in addition to formal ADR procedures set out above, tiered dispute resolution procedures with obligations to negotiate in good faith, (often known as 'Partnering Obligations' and Dispute Resolution Review or Adjudication boards, chiefly in the USA). We propose that similar clauses are incorporated into the entire range of Construction contracts.

With Corporate ODR for construction, consortia would sign up for ODR prior to the commencement of a building or infrastructure contract, using a process that is neutral, transparent and quick. A series of potential 'algorithmic' mediated solutions can be offered to the parties as an alternative to protracted and expensive arbitration or litigation.

7. Conclusion

LawTech, and disruptive technologies such as AI and blockchain are set to have a profound effect on legal services and especially dispute resolution.

The use of blockchain distributed ledger and smart contract technologies will have wide ranging effects in the conduct of litigation, and can be used to dramatic effect if the parties agree to abide by a trusted decision made by a neutral *4th Party*, to produce an outcome within days rather than years in the most complex of disputes. They can be more easily incorporated in anticipatory disputes, such as in Construction Contracts where a collaborative approach in design and construction is encouraged, and substantial progress has already been made to reduce the paper content of critical documentation to a digital form by the use of BIM.

Parties will be able to keep sensitive material confidential during the transaction, with smart contracts in place to reveal the contents of files, plans, economic models and other digital data once a dispute resolution process has been begun.

Widespread use of algorithmic discovery will affect the giving of legal advice before people decide to undertake litigation or ADR. Further, the use of other blockchain technologies in combination with AI, will also increase the speed at which disputes can be brought to a conclusion and resolution established, make significant reductions in the cost of litigation, and bring about certainty for those who are involved in the most complex and difficult disputes around the world.

References

[1].   Alternative Dispute Resolution (2017) Wikipedia,
https://en.wikipedia.org/wiki/Alternative_dispute_resolution

[2].   Online Dispute Resolution (2017) Wikipedia,
https://en.wikipedia.org/wiki/Online_dispute_resolution

[3].   Katsh, E. and Rifkin, J. (2001) Online Dispute Resolution: Resolving Conflicts in Cyberspace. Jossey-Bass Wiley, New Jersey.

[4].   Legal Technology (2017) Wikipedia, https://en.wikipedia.org/wiki/Legal_technology

[5].   UK Court Statistics (2016)
         www.gov.uk/government/uploads/system/uploads/attachment_data/file/527018/civil-justice-statistics-january-march-2016.pdf

[6].   UK Civil Procedure Rules (2017), www.justice.gov.uk/courts/procedure-rules/civil/rules

[7].   Lederer, F. (1997) The Courtroom as a Stop on the Information Superhighway, REFORM.
         http://scholarship.law.wm.edu/popular_media/43/

[8].   Crown Court Digital Case System (2016) https://www.gov.uk/guidance/crown-court-digital-case-system-training-guides-and-videos

[9].   Online Dispute Resolution: For Low Value Civil Claims: Civil Justice Council Report (2015)
         www.judiciary.gov.uk/wp-content/uploads/2015/02/Online-Dispute-Resolution-Final-Web-Version1.pdf

[10].   The Alternative Dispute Resolution for Consumer Disputes (Competent Authorities and Information) Regulations (2015) www.gov.uk/government/publications/alternative-dispute-resolution-for-consumers/alternative-dispute-resolution-for-consumers

[11].   Rahwan, I. and Simari, G. (Editors) (2009) Argumentation in Artificial Intelligence. Springer, Berlin.

[12].   Katsh, E. and Rabinovich-Einy, O. (2017) Digital Justice, Technology and the Internet of Disputes, Oxford University Press, Oxford.

[13].   EU Alternative and Online Dispute Resolution (ADR/ODR), (2017)
         http://ec.europa.eu/consumers/solving_consumer_disputes/non-judicial_redress/adr-odr/index_en.htm.

[14].   UNCITRAL Model Law on International Arbitration (2006)
         www.uncitral.org/pdf/english/texts/arbitration/ml-arb/07-86998_Ebook.pdf

[15].   Beam, C. and Segev, A. (1996) Automated Negotiations, A survey of the State of the Art.,
         University of California Berkley. www.cs.uu.nl/docs/vakken/vm/agents-negotiation.pdf

[16].   Rule, C. (2002) Online Dispute Resolution for Business. Jossey-Bass Wiley, New Jersey.

[17].   Barnett, J. (2003) The Virtual Courtroom and Online Dispute Resolution, Proceedings of the UNECE 2003 www.mediate.com/Integrating/docs/Barnett(1).pdf

[18].   Zeleznikov, J. and Nevas, J. (2009) Using BATNAs and WATNAs' in ODR Francisco Andrade, Paulo Novais, Davide Carniero,; Vol 6284 Lecture Notes in Computer Science, Springer, Berlin.

[19].   Building Information Modelling (2017) Wikipedia,
         https://en.wikipedia.org/wiki/Building_information_modeling