The Law of Algorithms and Algorithmic Dispute Resoltion

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Why consider the Law of Algorithms

- Background is the Court 21 Project at Leeds University
  - Virtual Courts
  - ODR
  - Consumer Disputes
  - IT enabled Dispute Resolution

- Now working with Philip Trelevan and Centre for Blockchain Technologies
- ALDR platform will be used to prevent systemic failure.
- But has great potential in the real world as opposed to just in financial trading.

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- The Construction Blockchain Consortium
- To pilot my ideas in a vertical market
- Examined the role of Blockchain: conclusion is if used in conjunction with other technologies has significant traction
  - BIM
  - Artificial Intelligence
  - Internet of Things
- So we have spent a year looking at where blockchain can make a difference
  - Safety/regulatory compliance
  - Design – the Panoptican Effect Jeremy Benthan
  - Supply Chain
  - Payments
  - Quantity Surveying
  - Building Management/Insurance
  - Development and Planning
  - Energy/Smart Cities

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The Algorithm Problem

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- Robo Advisers, Robots, Autonmous Vehicles, Bots
- Starting Point is Issac Asminov's 3 laws of robotics
  - A robot may not injure a human – allow him/her to come to harm
  - A robot must obey orders given by human except where such would conflict with the first law
  - A robot must protect its own existence – except where it conflicts with above
  - Added Robot may not injure or allow by inaction humanity to come to harm
- The big concern is the learning algorithm
  - What happens when one 'goes rogue'
  - Who is in charge
  - Sophia the Robot on a panel last week. Famous for saying she could do better than Donald Trump.
- Legal Personality?

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The ACM 7 principles for Algorithmic Transparency and Accountability.

- Awareness
  - Designers should be aware of possible bias
- Access and Redress
  - Regulators should encourage transparency
- Accountability
  - Instiutions should be made accountable for algo's decisions
- Explanation
  - Should be produced where requested
- Data Provenance
  - Including training data
- Auditability
  - Models should be recorded for auditing
- Validation and Testing.
  - Rigorous and routine testing is required and reports made public

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The Growth of use of Algorithms

- Algo Trading systems now account for 70 – 80% of US equity Trades
- Apple Google Amazon provide ‘virtual assistants’
- Financial ‘Robo Advisors’
- Google, Uber Tesla working on autonomous vehicles.

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The underlying tech:

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- **Knowledge Based Systems** - computer systems that reason, where knowledge is respresented as rules rather than implicity by code
- **Machine Learning** - an AI program with the ability to learn without explicit programming, changing when exposed to new data
- **Natural Language Processing** [NLP] application of computational techniques to the analysis and synsythis of natural language and speech
- **Sentiment Analysis**. Process of computationally identifying and categorizing opinions expressed in text – social media etc
- Can we design formal verification and/or cross validation techniques?
- Can we build a testing capability to examine the behavior of the Algorithm or perhaps a ‘black box’ approach?

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Add in Blockchain and IoT

- Distributed Ledger Technologies
- Smart Contracts

Result is

- Creation of trusted information without intermediaries
- The technology supports automation of processes
- Behavioual and Predictive Analysis of Big Data
  - Minority Report
  - Predictive Justice
  - Automated Risk Assessment that is a self fulfilling prophesy.

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The Opportunity

- Two major global markets where Blockchain/Distributed Ledger Technologies can be deployed to avoid disputes by
  - Massive reduction in litigation costs.
  - Preventing delay in completion of contracts
  - Encouraging collaborative business practices.
- Construction/Built Environment Sector
  - The Global construction market is 6% of world GDP with disputes running at 10%. value of disputes $13 billion in US alone
  - BIM: The Global Building Information Modelling Market is expected to grow from roughly **$4.6 billion today to $11.7 billion by 2022**[1]
  - London is the centre of Global construction market and also reputation for Global litigation
- Algorithmic Trading
  - The algorithmic trading market in EMEA was valued at USD 3.38 billion in 2015, and is anticipated to reach USD 5.34 billion by 2020, growing at a CAGR of 9.53

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Financial Algorithms

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- Began with algorithmic trading and the rise of Financial 'Robo Advisers'
  - Pre Trade Analysis
  - Trading signal - buy or sell orders
  - Trade execution
    - Agency/broker execution
    - Or Proprietary Trading on own behalf
- Rougue Trading
  - Knight Capital
    - Erratic trades on 150 stocks lost $440 m in 30 minutes
    - Warren Buffet ' contributed to the mass murder of $22 trillion'

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Other uses of Algos

- Robo Advisers
- Software based on machine learning algos for advice or portfolio management
- Regtech – costs firms $280 billion to comply
- Oblligations in MIFID and EU guidance on systems and controls
- Use by regulators to monitor trades in particular High Frequency Trading
- Automated reporting ‘red flag trades’
- Can we introduce due process which would allow regulators to impose sanction by an automated process?

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New Legal Issues

- Smart contracts – neither smart nor contracts
  - Code is Law
  - Hybrid – templates that feed into written contracts
  - Code as a business logic -ie payment is automated
  - New clase of enterprise contract proposed on Friday by Prof David Mosey – as a building project grows, the contract grows with it.
    - Construction has a prehistoric supply chain
    - Contractors are called contractors because they want to litigate

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Law

- What happens if the Algo breaks the law?
  - **Grand Chamber of the European Court of Human rights known as 'Shelias Wheels' (Tobler, 2011)**. In this case, an algorithm calculated a premium that was favourable to the insurers' female clients, but was struck down as it contravened the prohibition on discrimination on the grounds of sex.
  - **Trant Engineering v Mott** - 2017 - Mott the BIM coordinator revoked access codes to the CDE

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The law of Algorithms

- Easy - if there is a problem sue the human
- Which Human?
  - Commissioner
  - Designer
  - Specification writer
  - Programmer
  - Licensor/distributor
  - Integrator installer
  - Tester trainer - Knight Capital
  - Data set provider
  - Subcontractor
  - Owner
  - End User

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Algorithmic Dispute Resolution

- Grew out of Online Dispute Resoution ODR
- We have categorized the types of ODR into
  - Consumer ODR - ebay
  - Judicial ODR – where there is a hearing
  - Corporate ODR – heavy duty mutli party disputes involving large data sets, complex issues, parties in remote international locations

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‘the need for speed’

- Quick, independent series of negotiated options known as a ‘win win’ to encourage parties to avoid conventional litigation or ADR.
- Using BIM and smart contracts to identify key digital information at the start of the building contract
- Retain confidentiality by the use of cryptographic techniques that seal the material until access is necessary
- Use of AI techniques to identify key documents
- Use of Alogrithms
    - for risk assessment, predictive justice and sentiment analysis to establish the individual parties best negotiating position
    - identify hidden value in a set of data so as to provide the parties with a set of negotiation options, to encourage compromise.

Building Information Modeling

Attributes

- Physical
- Functional
- Organizational
- Contractual
- Administrative
- Financial

Algorithmic Dispute Avoidance & Resolution

Disputes

- Contracts
- Identity
- Assignment
- Verifiability
- Evidence
- Traceability

Distributed Ledgers Cryptographic Systems

Primitives

- Secure Keys
- Independent activities
- Undisputable truth
- Hidden verifiable records

Should there be a new Regulator of Algorithms?

- Tutt has recently called for an FDA for Algorithms who can match the complexities of the financial trickery
- Expert Regulator to devise
  - Testing Regime
  - Guidance
  - Best Practice
  - Standards
  - Expertise
- In partnership with Industry. Problem ‘The Partnership on AI’ or Elon Musks ‘Open AI’
- Or an overarching Algorithmic Regulator – such as the Health and Safety Executive
  - Can learn from other industries
  - Influence the way in which people react.

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The Big Question: Should Alogos have a legal personality?

- Predictive Justice - In 1977, Anthony D'Amato asked the question, 'Can/should computers replace Judges?'
- Can an Algorithm sit on a board of directors
- Can an Algorithm be prosecuted for manslaughter
- **Answers so far:**
  - In France Law 78-17 of 6 January 1978 Amended by Law No. 2004-801 of 6 August 2004 - Art. 2
  - R. (on the application of Software Solutions Partners Ltd) v Revenue and Customs Commissioners (2007) EWHC 971 (Admin) it was decided that a software program could not enter into a contract on behalf of an insurer.
  - Companies Act S156 A to be amended to ensure a director is a 'natural person'

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