How Will AI Shape the Future of Law?

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Foreword

Artificial intelligence is a catch word, very obviously. Policymakers just love it. If you have it in your research proposal, you might double your chances of getting funding. Even we lawyers have learned to use if (even if we would not always be able to say how it differs from automation, machine learning and other similar tech catch words). Including myself.

Why this is so? We are sure that the artificial intelligence is about to come and that it will change many ways we deal with law. We just do not yet really know how.

As such, the topic is not new. If you go through the lists of academic articles on artificial intelligence and law, you will find a continuation of articles from the 1980's onwards. And you will also find that the articles deal with the topic from a variety of angles.

As could maybe be expected, the articles cover almost anything the legal studies cover more generally. You can read about legal reasoning, privacy, copyright. You can read about envisioned changes of practices in the law firms and the courts. You can read about automatization and liability issues. You can read even about applications of AI in the field of criminal law.

010 In my early years as an academic scholar I had some interest in the theory of the so-called risk society. One question that was involved in the discussions was precisely the one whether technology is a blessing or a curse. Is technological development one of the causes of trouble as concerns the development of our societies, or could we use technological tools for the benefit of the governance of the society – and the control of the risks.

One observation in that discussion was that the technological development often happens outside of the political process. Innovations are just simply adopted without any legal policy debate, and the legislature tends to regulate the things after the facts.

In the 1980's and 1990's this was an issue when personal computers were introduced. This changed the work of the legal profession very much as well. There were talks about possible further waves of automatization and that routine activities or even more demanding decision-making could be automated and handled by machines. Not much happened at that front. AI continued to be rather science fiction.

I did a simple test. I searched the Finnish legal databases in order to find traces of any regulations or disputes as regards AI. Not a single hit.

If you search 'automation', you will already find something.

In the aviation law you will find regulation on unmanned aircraft.

And Finland got its first ever Space Act just this year.

Always when we see that new technologies are about to come, we find it difficult to judge how much it will really change.

Daniel Kahneman and Amos Tversky have shown that much of human reasoning is in fact rather intuitive, and only seldom are we able to really reach high standards of rationality in our reasoning. The qualities of factual legal reasoning are something that we should be looking at more closely. We should not be afraid of getting help,

if we can have that. But it seems that we still want out real cases to be handled by human beings. Just like we wish to see a barber, not a robot.

In any case, maybe the biggest issue is that concerning how we adopt the new technologies to serve us. It is extremely important that we lawyers are involved in these processes. It is quite natural that legal regulations could slow down this development, and in order to move forward, many new legal rules have to be elaborated. Liability issues concern accidents in traffic in which automated vehicles take part is a clear example. I believe we should be open-minded and curious and let the developers show what they can.

Some other areas are more sensitive. We should be mindful of legal cultures and legal traditions; we should adapt AI in law to recognize this, just as it does in linguistics. We should use technological tools to improve access to justice. We need legal design, bringing law closer to people.

The European union is today planning to introduce a European approach to the adoption of AI technologies. The Commission of the European Union outlined recently some basics of the European approach. It really makes sense to develop a European approach. This we have already seen in other fields as well; data protection being the most recent example. In the Communication the Commission states that: “This is how EU can make a difference – and be the champion of an approach to AI that benefits people and society as a world.” – These are big words, and these should be taken very seriously. Law seems to be rather important in this framework.

As with any transformative technology, artificial intelligence may raise new ethical and legal questions, related to liability or potentially biased decision-making. New technologies should not

mean new values. The Commission will present ethical guidelines on AI development by the end of 2018, based on the EU's Charter of Fundamental Rights, taking into account principles such as data protection and transparency, and building on the work of the European Group on Ethics in Science and New Technologies. To help develop these guidelines, the Commission will bring together all relevant stakeholders in a European AI Alliance. By mid-2019 the Commission will also issue guidance on the interpretation of the Product Liability Directive in the light of technological developments, to ensure legal clarity for consumers and producers in case of defective products."[1]

Finland could take an active role in contributing to this development since due to the upcoming Finnish presidency in the Fall of 2019 Finland gets to have access to the relevant tables where these things are being discussed. The European Union could and should a leader in combining high ethical standards with strong development of the tech tools. We have rather interesting times ahead of us, since so much is still in the making. We should contribute to all this. I think we are.

I have been happy to see that our Faculty has built for itself a profile in legal tech. This we have done in a close collaboration with the key players in Finland. Maybe we were a bit latecomers, that is what the legal tech freaks would probably say. But law faculties tend to be conservative, and things start to happen first when a signal gets stronger.

Some two years ago this started to happen. All this grew out of a relatively well-functioning collaboration with legal experts outside of the university frames. If I now look back, I believe that some activists

1 European Commission, Artificial intelligence: Commission outlines a European approach to boost investment and set ethical guidelines. Press release, Brussels, 25 April 2018.

within the IT law association of Finland have actually been rather important drivers of this development. In 2016 the first Legal Design Summit was organized in Helsinki, the Legal Tech Lab was launched, and now we have already had the second legal tech conference. Not only has the faculty been active, but the university itself has introduced new openings. Digital humanities is a new profile for the central campus, and our Legal Tech adds an interesting dimension to it.

When you try something and you see that the students are interested in it, then you can be sure that you have done something right. Legal tech lab with its various activities, such as the hackathons, is also a new way of learning by doing, and transferring knowledge to our makers of the future. Maybe even we oldies can have a minor role in this. In any case it is great fun to see all this happening.

Artificial intelligence used to be called science fiction. Now even the European commission says its already here. I'm glad we can jointly discuss the significance of AI for law.

KIMMO NUOTIO
Professor, Former Dean of the Faculty of Law
University of Helsinki

I

Digital transformation of the society?

LAURA KONTIAINEN[1]

Legal Tech Con 2018 – How Will AI Shape the Future of Law?

1 WHAT IS THE LEGAL TECH LAB?

In November 2016, the University of Helsinki Legal Tech Lab was established as a research hub focused on research of changes of digitalisation and law. The idea behind the Lab was that we need more information, from both academics and practitioners, to answer the challenges that the new technological developments as well as societal changes has brought with it to the legal field.

Our research strategy has loosely defined itself around five different areas – (1) foundations of legal digitalisation, (2) algorithmic fairness and justice by design, (3) legal approaches to information, (4) societal change in institutions and profession, and (5) digital access to justice and governance. As digitalisation is a massive theme that cuts through the whole field of law, we are approaching the themes from many specialties and points of view.

The questions of what digitalisation means in the legal field and what kind of changes to law, or interpretation of it, as well as to the

1 The writer is an LL.M student at University of Helsinki and research assistant at the Legal Tech Lab. She wants to thank assistant professor Riikka Koulu for her great support in writing this article.

legal professions it will bring were key part of the first Legal Tech Lab conference in 2017. Last year, in 2018, we held our second Legal Tech Con on AI and law, and this publication is a collection of articles based on that conference. In addition to belonging to the Faculty of Law, the Lab is also a part of the institutional settings provided by Helsinki Centre for Digital Humanities (HELDIG) at the University of Helsinki. While a major part of the Lab's focus is on research, we also take part in developing academic structures and collaboration. The Lab actively promotes interdisciplinary collaboration within and beyond academia and is actively engaged in the creation of working practices and methods to this end. We also strive towards broader knowledge mobilisation and societal debate on digitalisation of law. Everything we do centers around the idea that law is a changing thing, and we want to know everything there is to know about how that change is happening – or should happen.

This conference publication continues to dive deeper into the themes of the last Legal Tech Con. It starts with introducing how AI could affect the society and law. On the second part judiciary is examined as window to what AI use in legal field could look like in practice. The third part deals with topics of legal information and intellectual property. Finally, the fourth section includes articles on what directions the legal research on AI could continue towards. The articles are published as they were written, with only small edits to the language.

In addition to the two Legal Tech Cons, The Lab has also experimented on cross-discipline pedagogical experiments as a way to mobilize knowledge and engage students, with the idea that it is not only professions that are changing – education of law students also can change. One such experiment was a seminar Fairness Aware AI with the Department of Computer Science of the University of

Helsinki, where law students worked together with data science students to define fairness in algorithmic decision-making – a task that proved hard, but rewarding as even the question of 'what is fair?' started a long discussion. Last two years we have also held the Hack the Law! hackathon event, which in 2017 when it was first held was a new format in legal studies. During the event law students joined with students from other fields, such as data science and design to develop and create prototypes of products to help professional lawyers in their work, or improve the access of disabled citizens to legal services over the course of a single weekend, with the help of professionals and experts who agreed to mentor them during the event.

The Lab has also continued with its student volunteer program, engaging participants in understanding different questions in technology and law and how they themselves want to approach the subjects in their future careers. As future law professionals, student volunteers for example were interested in researching the current use of technology in the work of lawyers and what opinions law school alumni had on how their education had prepared them for the new technologies. This was done by creating together with the Finnish Lawyer Association and the Finnish Bar Association a question-aire that was spread widely among Finnish lawyers, and then collaborated with the Lab's postdoctoral researcher Beata Mäihäniemi to write a joint article on the changes to work and how that should be reflected in the education of law students. The collaboration also had value as a pedagogical learning method, and allowed the students to take a deeper ownership in the project than traditional coursework.[2]

2 Beata Mäihäniemi – Aapo Asp – Anna Band, Työelämätaitojen opettaminen ja oppiminen juristikoulutuksessa vastauksena digitalisaatioon. Lakimies 7–8/2018, p. 1024–1046.

As part of the community and dialogue-building aspects of the Lab's mission to foster discussion, we have also strengthened our affiliated researcher network and held researcher meetings with affiliated researchers, who work on intersections of law, technology, and society. These meetings are a way to offer feedback and exchange ideas in a non-formal setting, and therefore support the research process of participants from a mere idea to full-fledged research.

1.1 BRINGING CLARITY TO DIGITALISATION

In the research of the Lab we approach digitalisation and law thematically from a variety of perspectives, but with the united goal of understanding the changes happening and bringing clarity to the issues involved. The researchers of the Lab have for example done research on conflict management, and how it works with new technologies such as blockchains[3], which in addition to AI has been a much hyped concept lately. Another interesting new technological context for law has been platform economy, and we have done research on how access to justice works within that setting[4]. From a more interdisciplinary perspective, professor Riikka Koulu has also collaborated, among other things, on research on the way the expectations of the role of judges in the justice system are changing with the digitalisation.[5]

3 Riikka Koulu – Kalle Markkanen, Conflict Management for Regulation-Averse Blockchains? March 1, 2019. Forthcoming in R.M. Ballardini – O. Pitkänen – P. Kuoppamäki, Regulating Industrial Internet through IPR, Data Protection and Competition Law. Kluwer Law Int. 2019.

4 Riikka Koulu – Jenni Hakkarainen, Konfliktinhallinta alustataloudessa. In J. Päläs, & K. Määttä (eds.), Jakamistalousjuridiikan käsikirja. Alma Talent 2019. In press.

5 Riikka Koulu – Risto Koulu – Sanna Koulu, Tuomarin roolit tuomioistuimissa. Alma Talent 2019.

Bringing the theory of algorithmic fairness closer to practice during the past year has also been the Lab's project "Algorithms as Decision Makers? The potential and limitations of AI use in public administration", funded by the Finnish Prime Minister's Office[6]. The project focused on the conditions that need to be fulfilled for the public authorities to use of robotics and artificial intelligence in their decision making. The research project sought to clarify how current laws and regulations work apply to it, and how the regulatory framework for the use of AI needs to change for it to be a usable solution in public context.

The main suggestions made in the final report were to create a unified strategy for the use of algorithmic systems by public authorities, as well as regulate the use by a general law instead of multiple specialty ones so the unified strategy could be made. The base for the suggestions was, that it would also make it easier for the public authorities to fulfill the requirement that their actions, including automating decision making, are based on law. A third practical suggestion was to limit the automation to models using traditional decision-trees. While that would limit the complexity of the cases where automation could be used, it would help find a balance between legal protections of the subject of the decision and the benefits of automation in practice.

While regulatory framework is something that different stakeholders adopting AI technologies are interested in, the last few years there has also been an increasing effort to think about AI ethics. Ethical guidelines for both developers of AI, and parties using them have been published by multiple sources such as EU, scholars and tech companies themselves. As a result, the question of ethics

6 Riikka Koulu – Beata Mäihäniemi – Vesa Kyyrönen – Jenni Hakkarainen – Kalle Markkanen, Algoritmi päätöksentekijänä? Tekoälyn hyödyntämisen mahdollisuudet ja haasteet kansallisessa sääntely-ympäristössä, Valtioneuvoston selvitys- ja tutkimustoiminnan julkaisusarja 2019:44. Valtioneuvoston kanslia 25.6.2019.

washing has also come up – are we turning to guidelines as soft law instead of regulation?[7] Assistant professor Riikka Koulu is also taking part in the ACT (Autonomy through cyberjustice technologies) project at the Cyberjustice Laboratory at Université de Montréal and McGill University[8]. ACT has the goal of moving forward, and developing a governance framework to complement the variety of AI guidelines in ensuring fair use of AI for justice[9].

As the latest, just starting large scale project, the Lab concentrates on algorithmic transparency. It is an often proposed solution, including by the EU and the European Commission as well as many of the self-regulatory industry guidelines[10]. The idea behind transparency as a solution is that it allows for people to understand the way an algorithm works – or possibly auditors, or any outside party whose job it would be to ensure that the algorithm works in a fair manner. Some problems with transparency as a solution are that the differing interests and clarification of just what is meant by transparency – what should be

7 See for example Thilo Hagendorf, The Ethics of AI ethics: an Evaluation of Guidelines. arXiv preprint 2019. Available at https://arxiv.org/ftp/arxiv/papers/1903/1903.03425.pdf. See also Ben Wagner, Ethics as an Escape From Regulation: From "Ethics-Washing" to Ethics-Shopping? Pages 84–89 in Emre Bayamlioğlu – Irina Baraliuc – Liisa Janssens – Mireille Hildebrandt (eds.), Being Profiled: Cogitas Ergo Sum: 10 Years of Profiling the European Citizen. Amsterdam University Press 2018.

8 Project website: https://www.cyberjustice.ca/en/, accessed 6.8.2019.

9 See e.g. Neil Gunningham - Joseph Rees, Industry self-regulation: An institutional perspective. (United Kingdom)(Special Issue on Self-Regulation). Law & Policy, 19(4) 1997, pp. 363-414, p. 366, 370; Bert-Jaap Koops, Should Self-Regulation be the Starting Point? P. 109-149 in Bert-Jaap Koops - Corien Prins - Maurice Schellekens - Miriam Lips (eds.), Starting Points for ICT Regulation : Deconstructing Prevalent Policy One-liners. T.M.C. Asser Press 2006. Especially p. 124-126.

10 See, e.g. AI HLEG (High-Level Expert Group on Artificial Intelligence), Ethics Guidelines for Trustworthy AI. European Commission 2019; Microsoft, Our Approach to AI, available at https://www.microsoft.com/en-us/ai/our-approach-to-ai; IBM, Everyday Ethics for Artificial Intelligence, available at ibm.biz/everydayethics, websites accessed 6.8.2019.

open, and to whom – is not as easy as just using the term, and that it requires vigilance to spot the possible problems with the algorithms as they appear, instead of ex ante control. The new research project ALGOT (Potential and Boundaries of Algorithmic Transparency), which the Lab is part of, is focused on creating a socio-legal analysis of algorithmic transparency and its use in algorithmic governance.

2 BUSTING THE MYTHS OF AI

A little over a year ago, when thinking about this conference, the Lab reflected on how fast the technology – and the talk about technology – is changing. Today's buzzwords become old news fast, and the changing terminology does not make it easy to stay on top of the discussion. For the conference of 2018 we wanted to encourage more discussion and research between all stakeholders and everyone interested by bringing some clarity to the table, as well as try to separate hype from realistic paths of development for the future. We also wanted to question what we talk about when we talk about AI – what is AI, and what questions should we be asking and focusing on instead of assuming – in good or in bad – things that are not actually that relevant. For law, with its normative function, it is especially important that it is based on true understanding and correct assumptions of what is regulated. Our idea was to demystify AI (as well as law), and move the discussion towards practicalities from sci-fi where it had for decades been in popular discourse.

As the Lab wants to not only do research, but also popularize it, as well as mobilise knowledge, we didn't want the conference to remain only interesting for academics. We chose AI as our theme, as

it is talked about a lot, but still remains somewhat elusive in common understanding — especially when it comes to practical applications in the field of law. We wanted the conference to bring together people from multiple fields, to share their expertise and expectations on how the developing AI technologies will affect society and legal professions, as well as what is purely hype and what is reality in technological development. The AI as a very contemporary theme also reflects our larger research interest of change, in being a good showcase for questions of how is law changing in answer to the changes of society and technological development.

Our goal during the conference was to find answers to the question of "how should AI be used?", and our speakers rose to the challenge of answering the question from many perspectives during the conference. This question is shared by people across fields of study, and as a part of holding the conference, we hoped to inspire an exchange of ideas between people from different areas of law, as well as outside law. The question on how we can beneficially AI in the society touches everyone, and we wanted to popularize the research done in the subject – by having short science pitches from researchers, as well by inviting student panelists to talk about their subjects of interests in the field.

2.1 WHAT'S THE PROBLEM WITH AI (AND IS IT REALLY AN AI PROBLEM)?

The last few years have seen artificial intelligence (AI) become a major buzzword in the discussion about digitalisation and law. For its small share, the Lab has taken part in this dialogue in the hope of offering Nordic and European perspectives to the discussions on AI ethics and

technology regulation. As professor Kimmo Nuotio from the faculty of law of University of Helsinki stated in his opening remarks during the 2018 conference, the ethical and legal perspective is the implicit strength that legal scholars have and should bring to debates on digitalisation of the society.

More and more decision-making in different situations is being outsourced to algorithms, or at least uses algorithms to supplement the decisions made by a human. As data based decision-making technologies are developed, their accuracy increases, but the amount of data used – or the logic of the decision-making itself – becomes harder for humans to understand and handle. Nowadays the automation of decision-making happens also in situations which have a profound impact on our lives – our job, social security benefits and health, for example. That makes it critical that we can be sure of the decisions made on, for example, how to distribute healthcare resources, can be considered fair and acceptable – whatever we consider the criteria for fairness or acceptable results. The algorithms therefore cannot be hidden in Frank Pasquale's famous Black Box[11], where no one can later verify how they worked.

Already at the time of the conference the discussion about regulating new technologies had increasingly started to concentrate on data centric technologies, increasing pressure for practical measures. An example of this was the GDPR, which in the area of European Union made changes to the regulation concerning the use of personal data – including in automated decision-making. As automation has increased and become more widely used, the problems of profiling or predictive

11 Pasquale defined Black Box in this context as " a system whose workings are mysterious; we can observe its inputs and outputs, but we cannot tell how one becomes the other." See Frank Pasquale, the Black Box Society: The Secret Algorithms that Control Money and Information. Harvard University Press 2015. p. 3.

algorithms, such as re-enforcing historical bias, have become more obvious and a part of the public discussion. As talk of ethics of AI has become more common, many private and public sector stakeholders have created ethical guidelines and principles for developing and utilizing new technologies in a fair manner[12], as self-regulatory measures. The focus on ethical guidelines has also been criticised and called ethics washing, for example by Ben Wagner who has written that technology policy makers focused on ethical guidelines are "Unable or unwilling to properly provide regulatory solutions, ethics is seen as the 'easy' or 'soft' option which can help structure and give meaning to existing self-regulatory initiatives".[13]There remains a need for more concrete governance which can complement the softer guidelines of ethics, but allow for stronger protections when needed. While often the question of regulation is on whether and in which manner allow for the use of new technologies, the technology could also change the fundamental understanding we have of law and legal systems.

The field of data centric technologies is vast, and not very clear – and partly as a result we do not have consensus on what are the problems we are trying to solve. During the conference our first keynote speaker, renowned writer and urbanist Adam Greenfield gave one perspective on that when he talked about what the changes to the society and law could look like. He talked about the development of algorithms and what a world made on the terms of terms of technology instead of humans could look like. He pictured a possible future of algorithmic jurisprudence, which as a concept brings algorithms even to the most

12 See for example Google AI, available at: https://ai.google/responsibilities/responsible-ai-practices/; High Level Expert Group on AI (set up by European Commission), Ethics Guidelines for Trustworthy AI, 8.4.2019. Available at https://ec.europa.eu/futurium/en/ai-alliance-consultation. Both accessed 6.8.2019.
13 Wagner 2018, p. 84.

sacred area of judicial system, and brings up questions of optimizing legislation for specific goals, instead of principles. His view was not that of a traditional legal scholar, who would probably start with principles that legal traditions have formed throughout the history, but showed well that as the technology becomes part of all spheres of society, including the justice system, we need to be prepared to justify why these principles matter and need to be the base for the system even in the future.

One reason why the discussion on new technologies is unclear is that we don't necessarily have an answer to a question: "what we talk about, when we talk about AI?". In addition to tackling the challenge of interdisciplinary interaction between sciences, we don't have clear enough terminology for exact discussion on AI and new technology as a whole, either from the perspective of ethics or law. We talk about AI, automation of decision making, algorithms, and sometimes also about the larger scale of digitalisation or datafication of the society. All of the terms carry their own nuances – AI bringing into mind possible personality and citizenship of humanlike robots, algorithms on the other hand mostly numbers and letters running on the screen. While the nuances can be clear to someone who knows the topic well, it can make the discussion harder to follow to those who do not.

In the discussion of technology, digitalisation or datafication, no matter what terms we choose, the central question is that of data, which adds even more directions for the discussion – such as the problematics of privacy, or the subjectiveness of data, which is always socially constructed – that need to be taken into account when actually moving from theoretical talk towards practical solutions in society and on regulatory level.

As a short summary, using algorithms in decision-making can be understood as an umbrella term for multiple different types of uses of developing technology in the decision-making process. The algorithms can be used to aid decision-makers in their task, by, for example, profiling clients, or the decisions can be made by the algorithms with no final input from a human. Algorithms can, for example, use big data, gathered from multiple sources and combined in a manner that was never expected by the person leaving breadcrumbs of information around the internet. Or the algorithm could only have access to a single information sheet that a person submits to an insurance company for the explicit purpose of being used to make a decision of granting insurance. When it comes to regulating use algorithms or AI in decision making, this definition creates a challenge.

2.2 JUSTICE IS ELUSIVE - WHAT DO WE MEAN BY FAIRNESS?

If the terminology of technology can be unclear, similar challenge comes from trying to define another key term in the discussion of law and technology, fairness itself. It is a good example of a concept that is deceptively simple. It is also something that people have a strong intuitive feeling about – even small children can recognize if something feels unfair. In larger, society wide scale, it becomes far harder to create principles of fairness that everyone could agree on – and legal scholars have spent probably the whole history of legal scholarship trying. Part of the fairness discussion in AI context has been the question of algorithmic fairness, especially from the perspective of discrimination.

Algorithmic fairness means that the algorithm produces fair results – for a given value of “fair”. For the coders of the algorithm it relates to choices they make – what weight to give to different data points,

what data to discard from the decision-making completely and how to recognize bias in historical data used for machine learning. When it comes to defining what kinds of results we consider fair, however, it also becomes a question for policy makers and sociologist – do we want the algorithm to try and balance out historical imbalances and discrimination, by, for example, positive discrimination of minorities?

From the perspective of legal scholars to whom the long history of the concept of fairness is familiar, the question is often not about individual cases, but of finding out if there are justifications for different treatment of people. In cases of discrimination, this also ties together strongly with the assumption of discrimination and switched burden of proof as procedural principles, which place to onus of showing that their actions were justified on the party accused of discrimination. The different perspectives that experts in multiple views have on fairness, mean that to even understand where everyone is coming from, we need to start by defining the perspectives and key terms that we are using.

As the questions of algorithmic fairness, and how to use new technologies do not sit only within one field of research, it is clear that interdisciplinary work on the subject is necessary to get a comprehensive picture of the topic. To avoid reducing the knowledge and rich research tradition of different disciplines, from which the ambiguity of terminology stems from, to their bare-bones versions, experts from multiple disciplines are needed.

During the conference, Indrė Žliobaitė, our second speaker, who talked about AI and deep learning from data science perspective, and also gave an example on the limits of a single field of science working on it's own. Her speech highlighted the challenges that the writers of algorithms are facing, such as biased data and algorithmic fairness.

These lead to the need to also understand the social background of the historical data, as well as the results that the algorithm should get. For this kind of comprehensive picture, translating the expertise of one discipline to the language of others is necessary.

Part of the problem in interdisciplinary work – especially as far apart as social sciences, law and data sciences can be – has often been the lack of understanding between researchers. Different sciences understand social realities differently, and do not always share similar knowledge interests that could be used as a base for shared research or other work. In this publication, these challenges are talked about by Riikka Koulu and Timo Honkela in a joint article on algorithmic ethics, where they frame approach the topic from the perspectives of their different fields of research, and attempt to reach an understanding that could form a base for further interdisciplinary research.

2.3 FINDING A MIDDLE WAY BETWEEN HYPE AND FEAR?

Automating decision-making is a tempting option to human made decisions in many situations where the number of clients is large, and the amount of usable data gives an opportunity for more accurate predictions, as the algorithms can make meaningful correlations that are not obvious to human decision-makers and their accuracy increases with the larger scale of data available for learning. Other benefits for automation are that it allows for faster decision-making processes – which, especially when it comes to public authorities, can be a part of good governance as well a matter of access to justice. Optimistically algorithms have often been considered more value-neutral and unpolitical, avoiding thus the biases of humans as well as discrimination, but more and more the questions of both privacy and

individual's control over their data, as well as AI ethics and algorithmic fairness have risen.

We have visions of both utopias and dystopias – from decades old sci-fi stories where people do not need to work as everything happens automatically to films where prediction algorithms cause innocents be judged for future crimes they might commit. Keeping the dialogue realistic, somewhere in between of the fears or too careless optimism is not easy, with these kinds of strong emotional images in our minds. While it is now increasingly clear that the most optimistic views on adaptation of data centric technologies are not the full picture, neither is the opposite view – and to dispel both the positive and negative hype in a constructive manner, we need clarity on the subject of the discussion, as well as realistic ways to adopt data centric technologies with positive impact.

3 DIGITALISATION OF LEGAL PRACTICES

As the development of AI and digitalisation on larger scale affects law and our understanding of it, it also has an effect on professions and institutions, changing the role of legal professionals.

The questions of how to practically benefit from digitalisation have become more mainstream in the legal field, on a smaller scale with the development of tools for lawyers and citizens which can streamline processes and remove barriers to access to justice. On a larger scale, many governments researching the possibilities of automatisation of public services.

For professionals and law students this means getting used to working with digital tools, such as AI – in many predictions, the future of lawyers involves a stronger focus on tasks that require higher

expertise, whereas simpler research and contract writing could be automated. Sari Korhonen and Altti Mieho from Edita Publishing talk about how these changes reflect on legal information in their article on smart legal information services. The development of new kinds of tools is also something that needs to be taken into account while training future lawyers and other professionals, and it poses a challenge for a field where the students often get their first experience of work by helping with the routine cases as interns.

To gain a better understanding on what digitalisation looks like through the eyes of people working with law, we invited lawyers, researchers, as well as our final keynote speaker Dory Reiling who has decades of experience on the subject, to share their ideas and thoughts on digitalisation and law.

As the idea behind the conference was not to make it fully an academic endeavor, but also include the visions of the future from the field, the conference included a professional panel of current legal specialists where they addressed the the future of lawyers as a profession.

From the side of future professionals, the panel discussion was followed by three student writers, who were invited to present their current work on the topic of AI, and gain feedback from people who had more practical experience in the topics. The speeches included topics of patentability of black box AI and whether they, the positive effect AI could have on access to justice in the courts, as well as data breaches and hacker ethics. In their articles in this publication, the student presentors delve deeper into these topics.

3.1 GIVING NEW MEANINGS TO THE LEGAL CONCEPTS IN THE COURTS

The concluding keynote speech that summarized all the discussion was given by dr. Dory Reiling, an independent IT and judicial reform expert as well as a retired senior judge of Amsterdam District Court, who lent her considerable experience on how to translate technological hype into justice reforms – a task she had experience of throughout her career. According to her, the changes to the work of lawyers, or judges are inevitable. Majority of the cases that courts deal with day to day basis are relatively simple, and do not require much consideration on the part of the judge. She however stated that the courts with human judges are more of a changeforce for the future than a thing of the past, as the courts with human judges excel at as the giving of new meanings to concepts in different contexts, in order to get to a just result.

This reflected the talk of professors Riikka Koulu and Timo Honkela, who is an expert of artificial intelligence. They also discussed meaning negotiations and how focusing on developing algorithms capable of that could resolve conflicts based on misunderstandings between people. While a need for more explicit meaning negotiation happens all over human interactions, and creating algorithms capable of it in general could be an intense effort, smaller scale meaning negotiation of terms in a court room – of giving definition to legal concepts, is something that could remain the manual task of the courts.

Part of the idea for the conference was also to bring forth new directions of research – what kinds of AI related questions are of interest right now and in the future in different fields of law. The pre-conference workshop chaired by Beata Mäihäniemi and Hanne

Hirvonen from the Legal Tech Lab, the science pitches during the conference as well as the student presentors gave an opportunity for both established researchers and students to throw into air ideas that they were working on and thinking about last year.

As the actual conference was built around the idea of popularizing the complex issues of AI and law, the Lab also organized a pre-conference workshop for researchers. The questions raised in the pre-conference workshop were centered around the theme of how to best use AI to serve the society. The workshop participants brought forth multiple different views on the matter, representing in their specialties various legal specialties, such as criminal and contract law. These perspectives are represented in the article rising from the workshop discussions and experiences as well as the abstracts from the participants, where Beata Mäihäniemi and Hanne Hirvonen write about the current and possible directions the regulation of AI can take.

During the conference the research perspective was shown in the science pitches The idea of the science pitches is familiar from multiple tv shows. Everyone was given a short time in which everyone participating could explain what they were working on – to pitch their research projects in just seven minutes. The format allowed for a variety of different topics to be raised, and demonstrated well how AI can have an effect all over the society – and law as a reflection of it.

Some changes the researchers saw happening were to IP law – and the concept of authorship, reflecting also the first keynote speaker Adam Greenfield's speech where he asked if it even matters anymore if a human or a machine made a song or a painting the audience enjoys, to the changes to insurances when marine vessels become autonomous, to the Estonian E-residency experiment and meaning of borders. These also reflected the previous talk from Burkhard Schafer, where he used

traffic – and the changes to social relations and communication since the invention of cars – as an example of new technology that can lead to changes in the legal environment.

4 OUTCOMES

When it comes to AI, the problems are complex, rising from multiple different sources. Currently much of the discussion is centered on individual rights, and fairness from the perspective of an individual. The questions touch topics such as fundamental and human rights, especially right to be protected from discrimination, and, as a specialty of governmental operators, include requirements for good governance. The centrality of rights of the individual, and limitations to the use of governmental power provide a framework for decision-making that does not consider whether the decision was made by traditional human means, or by an algorithm – whereas such consideration needs to be taken in the discussion of liabilities when the system does not work as expected.

The discussion of how new technology will affect law and society is not new, as professor Kimmo Nuotio said in his opening speech of the Legal Tech Con 2018, but the lawyers strength in it is bringing to the table knowledge of law and ethics. Changes to the law and world can happen, and Adam Greenfield gave one vision of changes happening on a fundamental level of both in his keynote speech. A perspective on how new technological advances have both now and historically created societal changes which then lead to legal environment changing was shown by Burkhard Schafer during his keynote speech. Dr. Dory Reiling also had the view that we can be certain that change

is happening – but we can work with the changes instead of battling them.

To work with these changes, or direct them the way we want, interdisciplinary dialogue is needed, as highlighted by assistant professors Indrė Žliobaitė and Riikka Koulu and professor Timo Honkela. The science pitches showed that the change is happening all over, from IP law to insurance field, to concepts of nationality and borders, and the student perspectives brought forth questions of applicability of current legal instruments such as patents to algorithms, possibilities of technology to access to justice, and how so called “ethical hackers” challenge what needs to be criminalized in modern society.

The discussion of how will AI change the future – and how we should use AI draws from the fundamental basis of our legal and societal system, and continues the dialogue that has been going on on technological advancement since forever. As the topic is fluid, and the questions complex, no definitive answers can be given that would answer the questions the Legal Tech Con 2018 was based on. Still, the conference fulfilled it’s purpose of fostering dialogue and bringing clarity to the issues surrounding it.

JENNI HAKKARAINEN & KALLE MARKKANEN[1]

Picturing Technological Futures – an Interview with Adam Greenfield

Adam Greenfield, an American writer and author of *Radical Technologies*, gave the opening keynote speech at a Legal Tech Conference "How will AI change the future of law?", held at the University of Helsinki on June 2018. Technological development has narrowed the gap between artificial intelligence and human generated intelligence. As Mr. Greenfield described, AI can already mimic human expression in arts and has been used in e.g. automating tasks previously done by humans. As pointed out by Mr. Greenfield, jurisprudence may well be a domain where algorithmic automation is utilized in the future. However, one of the key messages from Mr. Greenfield was that the development is not and should not be inevitable, even though this deterministic line of development is overemphasized in the current discourse.

Mr. Greenfield ended his keynote with a question addressed to the audience. "How can we enact the conditions of justice in a world that is rapidly absconding from our understanding?" This provoking question resulted to a lively conversation among the conference participants about e.g. the future of lawyers and the meaning of conflict

1 Doctoral student Jenni Hakkarainen and LL.M student Kalle Markkanen from the University of Helsinki Legal Tech Lab.

management This article is a short interview of Mr. Adam Greenfield by Jenni Hakkarainen and Kalle Markkanen, made shortly after Mr. Greenfield's keynote. The interviewers both work at the University of Helsinki Legal Tech Lab.

In your book, you are talking about technologies that mediate modern radicalism. At the presentation, you were talking about how the world is slowly reduced into a set of rules. Usually radicalism results into opposing the rules. How do you see radicalism today?

Let's first be clear that when I talk about "radicalism" in this context, I by no means mean radical politics.

I personally consider myself as somebody of the left. I'm committed to that tradition, I'm committed to what we might think of as an emancipatory or a liberatory politics. I don't by any stretch of the imagination think these technologies necessarily are radical in that sense. So when I say "radical technologies," I mean technologies that act at the root of our conception of ourselves as individuals and collectivities. The technologies that we discuss in the book almost all pass that test. These are things that present real challenges to our very framings of the world, and who we are in the world.

You said that the change is not inevitable. If it happens, can we adapt to it?

We are an extraordinarily flexible species. We can adapt to anything right up to the point of extinction-level events. In anything short of physical extinction, there will be some human beings who will find a way to come to terms with it.

There will always be people in the world until the moment there are not, and those people will have a society. They will have a way of understanding themselves and who they are that will shape itself around whatever the physical, material facts of that moment in time are. If this particular set of potentials [around AI] we've been discussing comes to fruition, our societies will mold themselves around it, and then begin to act on that sets of potentials in line with their own desires and articulated needs.

Human society as a whole absolutely can flow like water around whatever obstacles are in its path, sure. As it happens, though, I was born in a particular place at a particular time, and I personally might not be able to adapt to that changed set of circumstances. Individual people can be pushed to the point of breaking relatively easily. Which, in turn, is an ethical concern. That is something you do not want on your conscience if you are a designer or a developer of technology. You do not want to push people to the breaking limit.

Who do you place you trust in if individual human beings cannot do much. What is the role of society as a whole or the community or nation states, who should we trust?

I do not think we should necessarily trust any given party. I think we should trust politics. We should trust our ability to contest and to enact new realities based on our dissenting view of the world. Right now, we are not doing that.

Who is the active party in this. Is it us as individuals, or do we have any structures that would somehow support the move towards this posthuman politics you are talking of?

Yes, I think there have to be structures that mediate between the individual and the world. Inasmuch as I am an individual myself and I insist on my individual prerogatives to a very great degree, I also think politics based on individualism has been almost fatal for the cohesion of any kind of ongoing purposive collective endeavor that is aimed at enacting reasonable human values.

Since 1979 or 1980 or so, [public discourse] has been all too much about the individual, and less and less about collective articulations. We need to rediscover how is that we can come together in one another's presence — open, vulnerable to one another, but collectively articulating some sense of a shared understanding of the world. And there have to be structures that mediate between these two things.

Do they look a lot like nation states or political parties?

You know, I don't think they do. I think they take on forms that the moment gives us. I do not know necessarily know what that looks like, but I can tell you I don't think it probably looks a whole lot like a traditional political party.

What is the role of law in all this? In this world of advanced capitalism, law is usually criticized for being an instrument for capitalism. Do you see any other roles law might have or does it have to take any other roles?

I am sympathetic to the Critical Law Studies perspective, but I don't think it's the whole truth. In my lifetime, I have understood lawyers as specialists in the resolution of human conflict. And that's deeper than merely enacting one or another set of power interests in any given moment of time. I think there is a world out there that is not simply cynically about power.

It is of course critical how we think about power in a deeper sense, about how we negotiate the allocation of power in the world. But I do not necessarily think that the practice of law is always corrupt or always rotten at its root. I think there's a vocabulary there and a set of traditions, particularly rights discourses, that I find to be very powerful in giving people a sense of their own agency. I wouldn't want to throw that away for the sake of being impeccably critical.

You said you trust in politics. Is there a role for tech developers or the way we make new technologies?

Yes, but only if they develop a whole lot more reflexivity. I think tech developers as a class have tended to be blind to the fact that they are a class. The developers of technology have been almost entirely mute as to the ways in which the things they develop do articulate their own class interests. The extraordinary homogeneity of the technological development community leads it far astray in terms of developing things that are of maximal utility precisely to a household of 25-year-olds with relatively few commitments, who are sharing a house in the Mission District in San Francisco, who have undocumented immigrants doing their laundry through an app and so on.

In the book, I said "a time of radical technologies demands a generation of radical technologists," and I really believe that. However,

right now you don't see very many radical technologists, and I think it's largely because privilege and comfort tend to blind people to the implications of their acts.

Do you see individuals could also take part in the development of technologies, or are we even forced to take part?

Nothing distresses me more than the claim that the only way to participate is to learn to code, or that everybody should learn to code, or that STEM education is somehow more important than anything else in life.

That's why I say I believe in politics. I believe there are all kinds of ways to contribute to the shaping of our collective existence. Technological inventions are a powerful one, particularly at the moment. There are also other processes that function as brakes or constraints on technological development. There are all kinds of human learning styles, all kinds of human expression styles and it seems highly unlikely that the only way that you can make a difference as an individual is to learn how to design technological systems, products and services. I find this improbable.

So every lawyer is not required to learn how to program?

No — god, no. That is, again, what small, cross-functional affinity groups are about. There should be local collectives [dedicated to activism around technosocial issues] where somebody brings to the table their technological expertise, somebody else brings to the table their policy expertise and somebody else again brings to the table their comfort and familiarity of the law. Working together they not merely

raise the competence of each individual, but they also form something that is more than the sum of its parts, something that has a throw weight and an ability to enact change in the world.

This is why I have always believed in interdisciplinary — or probably a better way of putting it is undisciplinary — education, where silos and boundaries between modes of knowledge are effaced. It's true that there is a lot of good in learning from other people in your own technical specialty, but I think the grandeur lies in the confrontation with someone who does not share that vocabulary. There's no way of learning more efficient than being compelled to explain something complicated to somebody who doesn't know anything about it. You've never truly mastered your own field until you can communicate its essence to people who do not share that perspective. That is where I think all the power lies.

Do you have a vision how to get there, since the networks we are surrounded by are more likely to support the silos we are in.

This is where I think concerted long-term effort on the part of individuals consciously operating in networks is the only thing that can work at all.

That puts a lot of pressure and responsibility to the individuals.

Yes, that burden falls upon our shoulders. I think that is the moment we find ourselves in. I don't see any other way around that. There are certainly no magical solutions to this. I don't think even the collective power of state regulation can necessarily do much to stop [AI] systems in their tracks.

044 You know, “overdetermined” is a word I keep coming back to. I would never say anything is inevitable, but the array of forces with great power that are invested in a certain set of outcomes around AI is so great that there is an extraordinary need for us as individuals to become aware of what the implications are for us and how we can push back against what we’re being offered. We need to develop new skills, new affinities, new connections, and the will to make things different than they are right now.

II

Will Digitalisation Lead to Robojudges?

AI in the Judiciary – an Interview with Dory Reiling

Dr. Dory Reiling is a renowned IT and judicial reform expert, who has previously, among other things, worked as a senior judge in Amsterdam district court. She has published widely on judicial reform as well as on IT and courts. During the Legal Tech Con 2018 she held a keynote speech on the topic of 'How to translate hype into actual justice reforms'. In this interview she talks about the same topic, her experiences in how to utilize AI in judiciary as well as what challenges that poses.

To begin with, what does using AI in the judiciary mean? How can AI be used in court?

Artificial intelligence can fulfill different roles for different case types/ disposition processes in the courts. Some of them have already proved to be useful.

Firstly, structuring information. In complex cases, pattern recognition can be useful in test documents and case files. An example from the US is eDiscovery, automated document examination for

1 This interview was conducted through email, answers were written by dr. Dory Reiling and edited by Laura Kontiainen.

disclosure. eDiscovery uses learning artificial intelligence, which learns through training what the best algorithm is to extract the relevant sections from a large quantity of information. The parties in the case agree on the search terms and coding to be used. The judge decides on the agreement. This methodology for document research is recognized by courts in the US and the UK. It is faster and more accurate than examination done by humans.

Secondly: advising. AI that can advise can be useful for people who need a solution for their problem, but also for legal professionals. In this case, AI not only collects relevant information, but it also answers a question. The user is free to decide whether he or she will follow the advice. This function can help people help themselves more, and thereby prevent disputes. If that is unsuccessful, support in finding a solution is an option. Support for working out a solution, or at least parts of it, can help make the judicial examination more of a routine exercise. A proven example is the Solution Explorer at the Civil Resolution Tribunal in British Columbia in Canada, which uses simple AI.

Thirdly: Predicting. There is a high level of interest in AI that says it can predict outcomes of judicial proceedings. An unpredictable outcome of a court case is a risk. With more complex cases, this risk increases. Hence, these is a lot of interest in AI that claims to limit that risk. In the US, AI tools are on offer commercially. This means that the workings, as trade secrets, are not transparent. Nevertheless, some tools provide some insight in how they work. A group of American scholars has developed an application which says it can predict the outcome of a case before the Supreme Court of the United States. The application uses information about the case, but also about the political preferences and the voting record of the individual judges.

The application claims 70% accuracy. The application that describes its workings in most detail is one that claims to predict outcomes of decisions by the European Court of Human Rights. This tool predicts whether in a given situation the Court will decide whether a certain clause of the Convention was breached. The tool works with earlier judgments. This means that the material the AI works with is already the result of a lot of complexity reduction. The tool claims 79% accuracy. The creators think the tool can be a useful help for judges because of its pattern recognition in a text document. Another example from the US is predicting recidivism in criminal cases. US judges use this tool in their daily practice. Meanwhile, the tool has been proven to overestimate recidivism in African-American defendants because it uses data from the past.

Finally, a last example: profiling. At least one legal tech firm in the US offers judge profiles for a fee. Their workings are not public, I have no information about their accuracy.

What are the benefits for increasing digitalization or using AI in the judiciary?

Court cases are governed by the right to a fair procedure, in Europe laid down in article 6 of the European Convention on Human Rights (ECHR). Digital procedures can bring considerable improvements to the way a court procedure complies with article 6 ECHR. Compliance with the right to a fair procedure in Article 6 of the European Convention on Human Rights increased:

- Easier court access through digital case filing.

- Equal access to information and increased transparency since parties' lawyers all have access to the digital case file.
- Less delay with instant messaging and automated case management. In one of our pilot courts, one full adversarial procedure, including a hearing, was completed in seven weeks.

Other improvements can be, for instance, increased Information security: digital documents are kept in a persistent format with metadata on their status. And moreover, process information is now public.

Are there some kinds of cases that are unsuitable for digital processes? What kinds of cases on the other hand are best candidates to move completely to the digital realm? Are the majority of the cases that come to court closer to which end?

Court IT can be many different things. It helps to understand what it is that courts do. Courts decide disputes, they also have a shadow function when their decisions are a guideline for behavior by others than parties to a case. Deciding disputes involves processing information. How courts process information is relevant for the kind of IT that is useful for courts. Parties, be they the prosecution, someone appealing an administrative decision, a couple requesting a divorce or a party to a civil case, bring information to court. In most cases, another party is involved: the defendant, an administrative body, a party contesting a civil claim. The court processes the information, and at the end of the process produces a result, an outcome. This outcome is new information. Courts transform information, and turn it into new information that can be of use for the parties involved. However, Hazel

Genns Paths to Justice research has shown that court decisions do not always solve the underlying problem.[2]

How courts process information is largely determined by two factors: (1) how unpredictable is the outcome, and (2) what is the relation between the parties? On this basis, cases can be divided into four groups. Below is first a description of the concept.

Group one: A package of information comes into the court (someone files a case), that information can be sufficient to decide the outcome of the case in question. For example, a money claim that remains undefended, or a one-sided request that does not involve a second party. The court, after doing the necessary checks, only needs to provide a title for execution, for instance a payment order or a default decision. The outcome is highly predictable, and parties do not need to exchange or provide more information.[3]

In my second group, parties bring a proposal to court, not because they have a dispute, but because the law requires the court to examine the proposal for legality. Here, before bringing the case to courts, the parties do exchange and share information, and work together to put together their proposal. Most family cases come into this group, as do certain labor cases. The cases in this group have in common that they largely deal with long term relationships and regulation is light. In this group, the court has a primarily notarial role, in verifying that all legal requirements have been met.[4]

So far, the outcome of the case was largely predictable. In more unpredictable cases, more activities are needed to transform the information to produce an outcome. Such activities can be requests for

2 See Hazel Genn, Paths to Justice: What people do and think about going to law. Hart Publishing 1999.

3 This is the equivalent of the concept of a zero-sum game in game theory.

4 Here, the configuration is similar to a win-win game.

054 further information, another reaction from the other party, a hearing, a witness hearing or a visit to examine a location.

Sometimes, while the procedure is in progress, parties still reach an agreement between themselves to settle their dispute. This is group 3. In this group, parties work together, that is, they exchange and share information, for a settlement, a win-win outcome.

If parties do not reach an agreement, a judgment is needed to end the case. This is group 4. In this group, whether the parties exchange information between them is not relevant for the outcome.

This give us a first impression of the way courts process information.

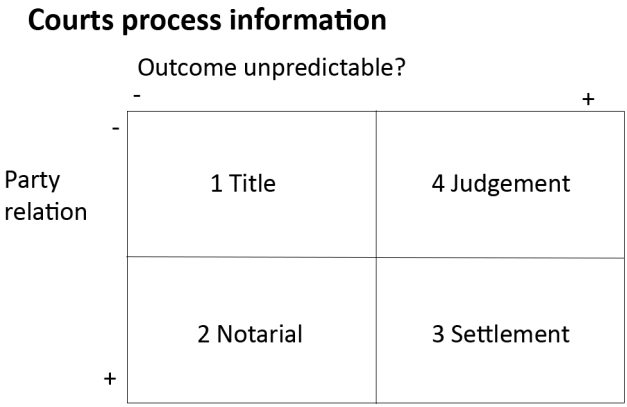

Figure 1 Courts process information

Next, it is helpful to find out how the total case load breaks up into the groups identified. In my research, I have found that for 1st instance civil cases in the Netherlands, group 1 is about 41% of the total case

load.[5] Group 2 is about 36%, so the predictable cases are a large majority. Group 3 is about 12%, and group 4 11%. This means that the group we see as the essence of court work, is actually the smallest one.

So how about IT for these groups? Group 1 lends itself to automation – with digital case filing, court staff no longer need to input data into the court systems. Because the outcome is largely predictable, automating the process, or at least parts of it, is an obvious use of IT for this group. Most courts already do some of this. They will extract data to compose the court decision, and some also use templates for the text. There may be some use for artificial intelligence, for instance to sort cases into streams, in this group.

For group 2, the IT of choice for the courts is the same. Some form of internet support may help parties put together a proposal that will comply with the criteria the court uses to examine it.

For group 3, an added benefit can come from negotiation software.

Group 4 is what we think of as the main activity of courts and judges. In terms of case load, it is just a little over 10%, but it is the majority of the judges' work load. Cases here can be somewhat to very complex. The amount of information in the case file can be considerable, legal research needs to be undertaken to bring the case to a close. This is where digital case files, knowledge systems and search engines come in. Artificial intelligence may be helpful for structuring large case files and for research purposes.

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5 Reiling, Dory, Technology for Justice, how information technology can support judicial reform. Amsterdam University Press 2009. Online at www.dory.reiling.com. On p. 120-122, there is a full description of the methodology used. The percentages in the book represent the total case load including bankruptcy cases. A later insight made me exclude bankruptcies from the case load for the purpose of this breakdown, since their process is, in the Netherlands, not comparable to case disposition. In this article, I used the new figures.

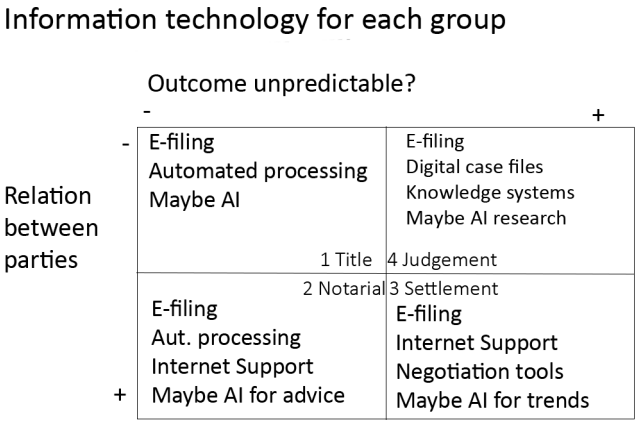

Figure 2 Information Technology for each group

You have written that to make AI useful for courts and judges, it needs to have legal information it can understand (through structure etc.), and be able to explain how it came to the end result. Do you think we are moving towards that being possible, and will it eventually lead to all cases being suitable for full automation?

My answer to the last question is negative. Court cases where there is a dispute, my group 3 and 4 cases, are actually a conversation between the parties, and of the parties with the judge. During the conversation, new insights can arise, and points of view may change. The parties and the judge need to come to some conclusion in order for the case to end. I do not see how that conversation can be fully automated. Besides, I do not see justice systems ready to produce legal information AI can understand any time soon. Article 6 of the

ECHR requires a fair procedure from courts and judges. It requires a transparent procedure, equality of arms for the parties, and also a reasoned judicial decision. Judgments, in their complexity reduction, must be reasoned, transparent, and offer equal opportunities for the parties. AI operates with legal information. In order to let AI work with legal information, the information needs to be operable for machines. This involves, among other things, the following.

Obviously, bad data reduce the quality of the AI-result. Correlations and statistical relations do not suffice as a foundation for a judgment. If AI needs to process and understand legal information, it needs to be structured and legally significant. Right now, text documents need to be supplemented with structure and significance retroactively. AI will be much more useful if legal information like judgments can be enriched for machine reading before publication with textual readability, document structures, identification codes and metadata. If legal meaning is added in the shape of structured terminology and meaningful relations, AI's potential increases even more. All that is still in the future. The general opinion is that AI, when applied in courts, must be able to explain how it reached its result. This can be an explanation of the process, but also with regard to the content of the end result. Research shows that generally speaking, AI is capable of this kind of explanation we now require from humans, but that in practice humans can explain some aspects much more easily than the AI.

058 **How willing are different stakeholders to use AI or digital processes? Is there a difference between professionals, such as judges or court officials, and the people involved in the dispute? Are there certain tasks that people are more or less reluctant to automate?**

Our experience in the Netherlands has been that people who are at ease with IT use welcome it. Those who are not so familiar with IT will, obviously, find it more difficult and probably be more skeptical. Bailiffs and lawyers are generally well aware of the economic benefits of automation. Replacing a paper procedure with a fully digital one, including changes in the procedural legislation, is a tremendous change for the courts. It takes judges and court staff way out of their comfort zone. So, it takes a lot of effort and patience to make this change happen. Some court systems now record hearings, either in audio or video. The Dutch appeal courts objected to having to use those recordings because they were afraid it would take too much time. So, the decision was to leave that till later. Another choice was to keep face to face hearings for most cases. The changes were big enough as they were.

In Netherlands, the digital procedure has been piloted in two courts. What kind of practical experience has that been? How have the users felt about it?

Some of that experience is already in my replies above. Our main learning point is about implementation. Replacing paper procedures with digital ones is a big change. Looking back, I think replacing a procedure in one operation should be done only for simple, short term procedures where the digitalization does not change the work

process much. For a full civil procedure, I recommend making the changes gradually, even if that means not taking full advantage of the digitalization at first. Our users had mixed feelings. Some were very happy, but others found the experience difficult. Let's not forget that court staff, who knew they were going to be replaced by the new system, cannot be expected to welcome the changes. In fact, they were very critical of what we were building, and that was extremely helpful in fine tuning the system. From earlier experience, I know it takes quite some time for users to be at ease with new functionality. Now, three years after the pilots started, and over 3000 cases in the system, everyone is quite OK with it. Unfortunately, the Minister of Justice has stopped funding for the project, so there is no funding to implement the system in the other nine first instance courts.

What types of difficulties are there when adopting new digital systems in courts?

The difficulties are everywhere. Don't forget, three quarters of all IT projects fail for some reason. Overall, we always underestimate the complexity of what we are trying to do. We are simply unable to foresee all the eventualities that will come our way in the process. And even if we are aware of that, it is still hard to manage the complexity. Building a procedure involves many different technologies all working together, so there is technical complexity. Once they do, there is the usability. So a lot of user testing is necessary, with a constant feedback loop between the development team and the users. Some users will want more automation than the team can provide, given the constraints of time and money. That brings us to the governance. Who decides about time and money, and about changes to the court work processes?

060 Government IT projects always have to deal with complex governance: budgets come from Parliament, which has high ambition but usually little knowledge. Professional organizations lobby for their wishes, civil servants in charge of the projects like to have big budgets instead of controlling cost.

As a follow up on that, how do the high regulation of the judiciary and the procedural rules affect the adoption of new digital processes? Are there any special challenges coming from that side?

Absolutely. Let me start with independence, which should underpin the impartiality of judicial decisions. This independence has taken very different shapes in different countries. In all cases, it is a delicate, complex balance between the judiciary and the Minister of Justice, who holds the budget. If changes in procedural legislation are needed, the legislative process may take quite some time. If the changes are big, this complicates implementation of the system. And now that technology has reached a point where procedures can be entirely digital, this poses new problems. As long as IT was a tool for specific activities like document production, the paper process is still dominant. With a fully digital procedure, IT has become an environment. This environment needs to be governed by the judges themselves, in accordance with the ECHR. So we need to figure out who can decide about the digital work process in that light. I see many judiciaries struggling with just this problem, in many cases without realizing that this is what theyr problem is. Next, I hear a lot of complaints about the legal profession, including the courts, being conservative. We must keep in mind that the courts and the judges are the guardians of the existing legal order. When big changes are made to the procedures and the way people

work, that takes those who are happy with the existing situation way out of their comfort zone. So it takes lots of training, caring, and also lots of patience.

How does developing IT systems for the judiciary differ from developing for other kinds of users, such as other officials, or private organizations? Are there special features that are required for the system to be suitable for the judiciary?

Private organizations, unlike government organizations and judiciaries, do not have to live in the limelight. Publicly funded organizations need to be transparent and accountable. In private organizations, IT projects can be complete failures without the rest of the world knowing about it. People expect systems for a judiciary to be completely secure, and rightly so. But do they have to be more secure than a banking system or the national tax system? What makes judiciaries and courts different, is that they deal with adversary procedures, in which there is access to the personal information of the other party, or of a defendant. This is most certainly an extra requirement for security.

SANNA LUOMA[1]

Artificial Intelligence Improving the Delivery of Justice and How Courts Operate

1 INTRODUCTION

> *What are the first associations come to your mind when you think about the court system in U.S.? If it is lengthy delays, high cost and occasional injustice, then you're not alone. Wouldn't it be wonderful if your first thoughts were instead efficiency and fairness?*[2] *– Max Tegmark.*

Court congestion is a problem affecting access to justice in several jurisdictions all over the world. Delays exist in the U.S. state and federal courts and are causing congestion as well as backlog.[3] Court congestion and undue delay means also delay to access to justice, a fundamental principle of rule of law.

1 LL.M. student Sanna Luoma also took part in the student panel during the Legal Tech Con 2018.

2 Max Tegmark, *Life 3.0 – Being Human in the Age of Artificial Intelligence* (2017), 107–109.

3 National Center for State Courts, 'Civil Justice Reform Initiative: Advancing Civil Justice Reform' NCSC Library eCollection https://ncsc.contentdm.oclc.org/digital/collection/ctcomm/id/86/rec/6 accessed 29 September 2018.

Technology is changing the court systems, and in many countries, there are plans to provide more efficient means to solve disputes to provide more access to justice as well as clear congestion and backlogs through technology. There are also many hopes for artificial intelligence (AI) to solve problems pertaining to access to justice and legal complexity.[4] AI systems are already used for help courts to assess various aspects related to bail and parole decisions for example. If we develop these tools to be more sophisticated, they might be a potential solution to the massive congestion courts are facing.[5]

What is artificial intelligence? AI can be defined in many ways and there is no unambiguous definition for AI. One way of defining AI is to compare its abilities to human intelligence. AI enables machines to perform intelligent and cognitive tasks.[6] To give a definition to AI, I am borrowing a definition from Kris Hammond: "[AI's] goal is to enable the development of computers that are able to do things normally done by people -- in particular, things associated with people acting intelligently."[7] In addition, as important as defining AI, is defining what is intelligence. Referencing Max Tegmark's definition, intelligence is ability to accomplish complex goals.[8] Judges are facing complex

4 Eric Allen Engle, 'An Introduction to Artificial Intelligence and Legal Reasoning: Using xTalk to Model the Alien Tort Claims Act and Torture Victim Protection Act' (2004) 11 Rich. J.L. & Tech. 2 accessed 29 September 2018.

5 Caleb Watney, 'It's Time for Our Justice System to Embrace Artificial Intelligence' (2017) Brookings https://www.brookings.edu/blog/techtank/2017/07/20/its-time-for-our-justice-system-to-embrace-artificial-intelligence/ accessed at 29 September 2018.

6 Oliver Theobald, *Machine Learning for Absolute Beginners: A Plain English Introduction* (2017), 14.

7 Kris Hammond, 'What is Artificial Intelligence' (2015) Computerworld https://www.computerworld.com/article/2906336/emerging-technology/what-is-artificial-intelligence.html accessed at 29 September 2018.

8 *Tegmark* (n 1) 64–65.

decision on a daily basis which requires legal knowledge, years of experience,
and intelligence to solve the case efficiently. Could machine be capable to perform same tasks faster?

Technologists have introduced an idea of a robojudge that would replace human judges as it would be more impartial, efficient, and it would not have human needs such as hunger and fatigue. However, predictions and speculation about robojudges seem a bit too optimistic at least according to today's legal writings and scholars in general – AI or robots will not take over the role of a judge. One reason for this is that it is not morally desirable to allow a computer to make judgements regarding people's freedom or even life.[9] Laws also require interpretation which is not always based on straightforward regularities and unambiguous rules as one would assume.[10] While we might not go as far as robojudges, AI could bring essential value to the court system and judicial decision-making process as a supplemental tool, supporting the judge's reasoning especially in easier cases such as routine civil matters.

This research paper will focus on how AI could be utilized in courts and judges' decision-making process and whether AI could bring more efficiency to the court system and thus, more access to justice in U.S court system. Furthermore, I will assess whether AI could be capable of taking the role of a judge in the future. This article will focus on the court system and alternative dispute resolution (ADR) processes in U.S. to provide access to justice to individual citizens in their

9 Arno R. Lodder & John Zeleznikow, 'Developing an Online Dispute Resolution Environment: Dialogue Tools and Negotiation Support Systems in a Three-Step Model' (2005) 10 Harv. Negot. L. Rev. 287, 291. Available at: https://ssrn.com/abstract=1008802.

10 Ibid.

everyday legal problems: separations, accidents, employment issues, neighbor problems, and land issues for example. I focus mainly on civil justice, but I will bring aspects concerning criminal justice as well. The structure of the paper goes as follows. First, I will address the issue of court congestion in the light of access to justice. Then, I will introduce qualities of AI and machine learning, and how these algorithms could be utilized in courts – and further, whether robots could be judges and why that might be beneficial to access to justice. Moreover, I discuss the benefits as well as challenges and downsides of using AI algorithms in courts and judicial decision-making. Last part focuses on the future: what kind of tools would be useful for judges and courts focusing on reducing court congestion and promoting access to justice. In this part, I analyze how combining online dispute resolution (ODR) and AI could empower judges' daily work providing more access to justice.

2 AI IMPROVING THE DELIVERY OF JUSTICE IN THE COURT SYSTEM

2.1 ACCESS TO JUSTICE

Access to justice is a basic principle of the rule of law meaning that individuals can exercise their rights, challenge discrimination and have their voice heard i.e. bring their case in front of the judge including access to legal assistance and representation.[11] Today, access to justice in U.S. state courts is mainly access to physical courthouses and the in-person, real-time availability of justice system decisionmakers i.e. law

11 U.N. website, 'Access to Justice, United Nations and the Rule of Law' https://www.un.org/ruleoflaw/thematic-areas/access-to-justice-and-rule-of-law-institutions/access-to-justice/ accessed at 13 April 2018.

enforcement, prosecutors, and judges.[12] However, millions of people in the U.S. do not have proper access to justice mostly due to lack of resources in federally funded civil legal aid. Likewise, public defenders, whose caseloads already exceed the recommended limit, are not capable to help everyone in need.[13] People might also have difficulties to commute to court and take the day-off from work to attend court proceedings. Therefore, the U.S. Department of Justice established the Office for Access to Justice (ATJ) in March 2010 to focus on this "access-to-justice crisis" in the criminal and civil justice system by promoting accessibility, fairness, and increasing efficiency in court system.[14] ATJ works to inter alia promote less lawyer-intensive and court-intensive solutions to legal problems as well as research which provides solutions to closing the gap between the need for and the availability of quality legal assistance.[15]

The World Justice Project (WJP) is an independent organization working to evaluate rule of law worldwide.[16] WPJ highlights that access to civil justice requires court system to be accessible, affordable, effective, and impartial. They measure e.g. civil justice by index which consists of the following key factors: accessibility and affordability; civil justice that is free of discrimination, corruption, improper government

12 J.J. Prescott, 'Improving Access to Justice in State Courts with Platform Technology' (2017) 70 No. 6 Vand. L. Rev., 1993, 1995. Available at: https://ssrn.com/abstract=3080615.

13 The United States Department of Justice, Office for Access to justice, 'About the Office' (2017) https://www.justice.gov/atj/about-office accessed at 13 April 2018.

14 Ibid.

15 Ibid.

16 World Justice Project, 'About us' https://worldjusticeproject.org/about-us accessed at 29 September 2018. "[WPJ was] founded by William H. Neukom in 2006 as a presidential initiative of the American Bar Association (ABA), and with the initial support of 21 other strategic partners, the World Justice Project transitioned into an independent 501(c)(3) non-profit organization in 2009. Its offices are located in Washington, DC, and Seattle, WA, USA."

influence; civil justice being effectively enforced; and alternative dispute resolutions are accessible, impartial, and effective. Furthermore, the delivery of effective civil justice also obliges that court proceedings are not subject to unreasonable delays.[17] AI has a lot of potential to improve many of these aspects.

The WJP collects data on how rule of law requirements are fulfilled in several countries and gives scores to these countries by evaluating justice with different defined factors such as civil justice factors discussed above.[18] According to their data, U.S. overall score was 0.73 while 1.0 is the best possible score, and U.S. was ranked as 19th from 113 countries.[19] In civil justice, U.S. scored only 0.42 in accessibility and affordability and 0.61 in having proceedings that are not subject to unreasonable delays. Even though these results are quite alarming, on the other hand, India scored only 0.16 and Italy 0.36 in the factor "no unreasonable delay" in civil justice. Thus, congestion and delays are a real problem concerning court systems and it is affecting access

17 World Justice Project, 'Civil Justice (Factor 7), Factors of Rule of Law' https://worldjusticeproject.org/our-work/wjp-rule-law-index/wjp-rule-law-index-2017%E2%80%932018/factors-rule-law/civil-justice-factor-7 accessed at 29 September 2018.

18 The World Justice Project, 'WJP Rule of Law Index 2017-2018' (2018) 2–4, 156–163 http://data.worldjusticeproject.org/ accessed at 13 April 2018. "The Index's methodology and comprehensive definition of the rule of law are the products of intensive consultation and vetting with academics, practitioners, and community leaders from more than 100 countries and 17 professional disciplines." For example, "[t]he country scores and rankings for the WJP Rule of Law Index 2017–2018 are derived from more than 110,000 household surveys and 3,000 expert surveys in 113 countries and jurisdictions." WPJ data is collected through a general population poll representing sample of 1,000 respondents in the three largest cities of each country (in *e.g.* U.S. New York, Los Angeles, and Chicago) and qualified respondents' questionnaires consisting of closed-ended questions completed by in-country practitioners and academics with expertise in civil and commercial law, criminal justice, labor law, and public health.

19 Ibid 3, 25. Interestingly, compared to last year, the United States ranking changed down one position from 18th to 19th. U.S. was ranked as 19th out of 35 countries categorized under "high income" countries which is a relatively unsatisfactory position.

to justice. Also countries, such as Finland, who did well in the ranking, got lower scores (0.63) from accessibility and affordability as well as providing proceedings without unreasonable delay.[20] It is alarming that U.S. rank is lower than most of the western countries.

Right to fair and public hearing without unreasonable delay is a recognized fundamental right in several jurisdictions. For example, European Convention on Human Rights[21] Article 6(1) states that "in the determination of his civil rights and obligations or of any criminal charge against him, everyone is entitled to a fair and public hearing within a reasonable time by an independent and impartial tribunal established by law." In the case practice of European Court of Human Rights, the court has passed several sanctions related to delays in court proceedings subject to the article 6(1).[22] Accordingly, the U.S. Constitution recognizes a right to a speedy trial in the sixth amendment regarding criminal proceedings. Also, other U.S. provisions are enhancing the right to a speedy trial by securing the just, speedy, and inexpensive determination of every action and proceeding.[23]

Regardless of these provisions, courts are struggling from backlogs and congestion in reality. Thus, individuals lack proper access to justice if they cannot get their case heard in a reasonable time. This is not a novel problem to the court system – in last decades, courts have adopted alternative choices for parties to solve disputes in order to

20 The World Justice Project, 'Country profile: Finland, WJP Rule of Law Index 2017-2018' http://data.worldjusticeproject.org/#/groups/FIN accessed at 29 September 2018.

21 Convention for the Protection of Human Rights and Fundamental Freedoms, Rome, 4. XI. 1950.

22 See eg *Kukkonen v. Finland* App no 47628/06 (Commission Decision, 13 January 2009). Not to mention the multiple cases brought against Italy regarding unreasonable delay and article 6(1).

23 See eg Fed. R. Civ. P. Rule 1 and 18 U.S. Code § 3161.

clear the backlog and reduce the amount of cases that are going to trial. Below, I am discussing further what is causing delays in courts and what measures have been taken to mitigate those delays.

2.2 CONGESTION AND DELAY AS A PROBLEM OF ACCESS TO JUSTICE

It is said that justice delayed is justice denied. Long duration of court proceeding can be identified as a fundamental failure of access to justice.[24] The primary and inevitable outcome of court congestion is delay and a lot of these delays are institutional i.e. caused by congestion and backlogs in courts.[25] Alternatively, congestion occurs when judges have a backlog of older cases or cases which have higher priority. Thus, small civil claims with lower priority are sometimes unduly delayed.

Budget cuts and under-staffing are one of the reasons why courts are facing congestion and backlogs. For example, in California, budget cuts since 2008 have closed 52 courthouses, reduced services statewide, and decreased access to justice.[26] Many Californians must travel longer distances, miss time at work, and wait long to have their day in court due to these budget cuts.[27] While the California judicial branch has regained some of the funding it lost during the recession,

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24 HiiL Trend Report IV, 'ODR and the Courts: The Promise of 100% Access to Justice', (2016) 27 https://issuu.com/hiilrechtwijzertechnology/docs/hiil_online_dispute_resolution_tren_d5f3bbbcedea3d accessed at 29 September 2018.

25 See eg, Francis D. Doucette, 'Court Congestion and the Right to Speedy Trial in Massachusetts' (1995) 24 New Eng. L. Rev. 1095.

26 California Judicial Branch, 'In Focus: Judicial Branch Budget Crisis' http://www.courts.ca.gov/partners/1494.htm accessed at 13 April 2018.

27 Ibid.

the judicial branch is still "unsustainably underfunded" and California trial courts will see no new funding in 2018 either.[28]

Problems of court congestion do not only appear in U.S. In some jurisdictions, such as India and Italy, the congestion in the courts is very extreme. For example, Italian civil proceedings can be inefficient in terms of the time it takes to litigate each case. The Italian civil proceedings before first instance courts can last up to three years because the hearings required to resolve the lawsuit are scheduled so far apart. This creates gaps in evidence and explanations which leads to unfair and uncertain proceedings since the judge will be less familiar with the case.[29] Thus, these delays could be reduced through better case management. On the other hand, in India, the amount of incoming cases is just so massive, that courts do not have the capacity to clear already existing backlogs. It is estimated that if the Supreme Court of India takes no fresh cases and there is no increase in judge strength, a dedicated period of nine months of fulltime judicial attention would be needed to clear the backlog.[30] Hence, often the main reason for court congestion is lack of resources or structural failures. For example, the backlog in caseload on Indian legal system is resulting from among other factors overly elaborate, unenforced procedures, automatic

28 Maria Dinzeo, 'Modest Gains for Judicial Branch in New California Budget' (2017) Courthouse News https://www.courthousenews.com/modest-gains-judicial-branch-new-california-budget/ accessed at 29 September 2018.

29 Simona Grossi, 'A Comparative Analysis Between Italian Civil Proceedings and American Civil Proceedings Before Federal Courts' (2010) 20 No. 2 Ind. Int'l & Comp. L. Rev., 213, 271. Available at: https://ssrn.com/abstract=2145497.

30 Nathan Rehn et. al., 'Justice Without Delay: Recommendations for Legal and Institutional Reforms in the Indian Courts' (2011) 4 Jindal Global Legal Research Paper, 8–9. Available at: https://ssrn.com/abstract=1679350

appeals, and systemic vacancies from the bench, and critically misaligned incentive structures, among other factors.[31]

One option to deal with court congestion would be increasing the court staff handling the cases. However, by increasing the number of judges and personnel to deal with cases, it is possible there would simply be more cases filed and the delays in the proceedings would be the same.[32] The same thing applies to technology – while technology can make court proceedings cheaper and faster, so called rebound effect might appear meaning that when something is cheaper and faster, people will simply use it more.[33] Interestingly, the problem lies also in attorneys and legal services. That is, judges are overloaded with information in individual cases where attorneys paid by the hour have every incentive to add more information to the cases. Nowadays, due to technology, it is easier to discover information that may be relevant such as e-mail archives, videos, and transcripts of telephone conversations. Adding these to individual cases increases the difficulty of and workload required for fact-finding, and adds to the costs in terms on money and time of going through all this information. Also, legal information, such as case law, is increasing continuously, meaning that judges will have to manage more complex information. More information also requires better procedures for organizing it.[34] Therefore, we should promote more ways to solve civil disputes that

31 Anjanette H. Raymond & Scott J. Shackelford, 'Technology, Ethics and Access to Justice: Should an Algorithm Be Deciding Your Case?' (2014) 35 Mich. J. Int'l L. Available at: https://ssrn.com/abstract=2309052.

32 *Grossi* (n 28) 271.

33 Josh Becker, CEO, Lex Machina & Scott Reents, Lead Attorney, Data Analytics & E-Discovery, Litigation Cravath, Panel Discussion at 'The Future of Law – the Case for Analytics webinar' (Mar. 29, 2018 at 10:00-12:00am).

34 *HiiL Trend Report* (n 23) 30.

are less lawyer-intensive and provide more tools to solve dispute on a lower level.

Courts have been able to reduce the problem by providing ADR processes for civil disputes that require less time and effort from courts. ADR consists mainly of arbitration, mediation, and negotiation in which a neutral person helps parties to reach a settlement without proceeding to trial.[35] This neutral person can either be a judge or outside counsel or other professional. Thus, mediation can be maintained by courts and held in front of a judge although the process as such is informal and separate from a trial.[36] A judge can initiate a mediation, but parties may also take the initiative.

As mentioned above, many problems related to access to justice also result from difficulties to physically access a courthouse. Hence, one way to increase access to justice is to take courts to online. Online dispute resolution (ODR) environment is ”a virtual space in which disputants have a variety of dispute resolution tools at their disposal.”[37] ODR can be used, when properly implemented, both fully in court proceedings and pre-trial phase ADR such as online mediation or negotiations. ODR system either used in court or ADR is foreseen as a solution that would be an effective mechanism to reduce barriers to accessing justice.[38] ODR means different concepts and it can be partly or entirely online. These concepts are inter alia an ODR conducted

35 *Lodder & Zelenikow* (n 8) 296.
36 See eg Superior Court of California County of Santa Clara website (2018) http://www.scscourt.org/court_divisions/civil/adr/civil_adr.shtml accessed at 30 September 2018.
37 Arno R. Lodder & John Zeleznikow, ‘Artificial Intelligence and Online Dispute Resolution’, in *Online Dispute Resolution: Theory And Practice, A Treatise On Technology And Dispute Resolution* (2012) 92. Available at https://research.vu.nl/ws/files/3097325/Lodder%20and%20Zeleznikow%20(2).pdf
38 *Raymond & Shackelford* (n 30) 486–87.

exclusively online or ODR utilizing electronic media, such as video conferencing and e-mail in the proceedings or mediation.[39] Benefits of ODR are especially in the fact that it is online – in U.S., attending the court hearing physically is a deal breaker to many citizens for several reasons whether it is transportation or time to take off from work in order to attend the court. Taking court and disputes online could increase the accessibility substantially which is one of the reasons why courts in U.S. and other jurisdictions are adapting these platforms to court services.

Many of the existing and most progressive ODR tools have been developed primarily to facilitate negotiations and resolve e-commerce disputes or other issues related to the Internet.[40] For example, e-commerce companies such as eBay are already using ODR in their consumer disputes which are private by their nature and thus, not solved in courts.[41] Even though ADR and public ODR already exist in several countries,[42] implementation of these has been rather slow paced. However, courts are investing to technology to improve access to justice – e.g. in England and Wales, courts are planning to invest £700

39 *Lodder & Zelenikow* (n 8) 301.

40 Ibid. 298. "The major reasons for the popularity of handling e-commerce or Internet-related disputes online are that 1) access to the Internet is not a problem because the parties concerned already had online contact before the dispute arose, and 2) the information crucial to their dispute will usually be available electronically."

41 Maximilian Bulinski & J.J. Prescott, 'Online Case Resolution Systems: Enhancing Access, Fairness, Accuracy, and Efficiency' (2016) 21 Mich. J. Race & L., 205, 208. Available at SSRN: https://ssrn.com/abstract=2777059.

42 See generally, Joint Technology Committee, 'Case Studies in ODR for Courts: A View from the Front Lines' (2017) http://www.ncsc.org/~/media/Files/PDF/About%20Us/Committees/JTC/JTC%20Resource%20Bulletins/2017-12-18%20ODR%20case%20studies%20final.ashx accessed at 30 September 2018. For example, Civil Resolution Tribunal in small claims in British Columbia, however, has been quite successful and there are plans to expand the use of this ODR from 5,000$ claims up to 25,000$ claims.

million in bringing their procedures online.[43] Also other court systems are shifting towards e-filing and online case management systems meaning that all people working on a case will have access to the same files and documents which will have great impact in work efficiency in courts.[44] Thus, the use of ODR in the court system and negotiations will most probably increase in the future.[45] Filing online through an ODR platform facilitates the possibilities of using AI in courts – an ODR platform brings a lot of potential to combine machine learning and data processing to court systems. There are already theories regarding use of AI – machine learning and neural networks – in combination of ODR which I will address more deeply in chapter 4.1. of this paper.

To conclude, ODR or other similar platform technology would bring courts closer to the individual and make it easier to access to court.[46] However, if legal services become cheaper and more accessible through technology, and courts do not get more resources, it might result in even more congested courts. Attempts to increase access to the courts may also lead to unintended regressive consequences such as increasing the workload in courts which causes even more delay. That is why we need to think of solutions that also makes judges' work more efficient and thus, reduce their workload. As it is well put in this article regarding massive court congestion in India that some might argue that "increasing access is a paradoxical goal for a system already loaded with cases".[47] Nevertheless, we should not think that

43 *HiiL Trend Report* (n 23) 11.
44 Ibid.
45 Richard Susskind and Daniel Susskind, *The Future of the Professions* (2015) 67-68. Richard and Daniel Susskind discuss about that there are already some online dispute resolution (ODR) platforms used in courts in England and Wales, which is "definitely an exciting milestone in the history of court system".
46 *Prescott* (n 11) 2050.
47 *Rehn et. al.* (n 29) iv.

the problem is that there are too many cases going into the courts, but there are too few coming out. Courts should provide justice and not try to restrict it.[48] To this problem, AI can bring an essential value through automatization of judges' daily work. Further, I discuss the use of AI in courts.

3 AI AND COURTS

What use can AI be for courts and what does it take? There are already various AI systems used in legal services such as case prediction, contract management, and due diligence tools e.g. Lex Machina, KIRA Systems, and Gavelytics.[49] Furthermore, AI-driven risk assessment tools for bail and parole decisions are already used in the field of criminal justice some states. In this section, I am addressing the possibilities of AI for the court system. The question is, could machine learning and AI possibly help improve judges' decision-making process and

48 Ibid. that "[t]he challenge of court congestion is not one of efficient waste disposal, but of delivering timely and meaningful justice through functioning courts. Increasing access includes tackling the continuing delays (demand and supply-side), as well as reducing the backlog that weighs down the system. Enhancing accountability includes examining rules as well as informal norms of judicial procedure, augmenting the positive feature of the same, and improving the efficiency of the judicial system by eliminating practices leading to unjustified delay. In the context of a growing population and economy, to serve the rule of law, and to ameliorate basic social problems, these remain the most pressing matters being pursued under the general heading of 'judicial reform.'"

49 Gavelytics' AI-powered analysis algorithm which parses vast amounts of litigation data to generate actionable insight such as judges' tendencies how they rule, possible outcomes, and help lawyers to write a "winning" motion regarding the jugde's ruling history. Gavelytics, https://www.gavelytics.com/ (last visited Apr. 13, 2018). See also Zach Warren, 'Gavelytics Localizes Judicial Analytics for California Litigators' (2017) LegalTechNews https://www.law.com/legaltechnews/sites/legaltechnews/2017/09/26/gavelytics-localizes-judicial-analytics-for-california-litigators/ accessed at 30 September 2018.

case management by making it faster, more efficient, and maybe even more impartial? In this chapter, I will assess to what extent AI could be used in judicial decision making besides or instead of human brain and judgment.

3.1 CAN ROBOTS BE JUDGES?

Researchers have agreed for years that AI will have a great impact to legal profession.[50] In their article, Dana Remus and Frank S. Levy discuss whether robots can be lawyers. An essential part of lawyer's work could be subject to automation by AI. For instance, lawyers in tier one firms use approximately 30% of their time in total for routine work such as case administration and management, document review, due diligence, and fact investigation.[51] If we think about document review for example, it often means going through similar documents that have recognizable patterns. Thus, AI will specifically have strong impact on document review.[52] A lot of the aforementioned is, at least indirectly, applicable to judges. Therefore, my question is, could robots be judges? I still hold on to the view of most legal researchers – robots will not replace judges. However, in this chapter I will consider the question of to what extent use of AI in courts could bring efficiency and mitigate human failures.

When modeling a judgement, a judge's decision-making is based on consideration that ensures the same result for all cases which can be identified as structured or routine process. While judges' work seems

50 *Susskind & Susskind* (n 45).
51 Dana Remus & Frank S. Levy, 'Can Robots Be Lawyers? Computers, Lawyers, and the Practice of Law' (2016) 8 https://ssrn.com/abstract=2701092 accessed at 30 September 2018.
52 Ibid. 18.

very complicated, machine learning model can predict future judicial decisions through "a mathematical combination of characteristics taken from the case".[53] Through these "combinations of characteristics" AI is capable to predict court cases outcomes with high accuracy. Furthermore, natural language processing (NLP) has been proven to be good tool for case predictions.[54] Court judgements in U.S. and common law countries tend to have a distinctive structure, which makes them particularly suitable for a text-based analysis. Court cases are usually written in a similar way and procedure, the facts, the circumstances of the case, relevant law, legal arguments, parties submissions, and outcome of the case can be easily recognized from cases due to these similarities.[55] By training AI with textual features extracted from given cases, an actual decision made by the judges was reached as the output.[56] Thus, AI have already reached the level of solving cases corresponding the actual outcome by a judge. In cases where the facts are undisputed, the law is clear, and well-established precedents exist, AI software can analyze the circumstances and produce a draft

53 Ibid. 12–13.

54 Nikolas Aletras et. al., 'Predicting Judicial Decisions of the European Court of Human Rights: a Natural Language Processing Perspective' (2016) https://peerj.com/articles/cs-93/ accessed at 30 September 2018. See also, Daniel Katz et. al., 'A General Approach for Predicting the Behavior of the Supreme Court of the United States' (2017). Authors received 70.2% accuracy at the case outcome level and 71.9% at the justice vote level over nearly two centuries (1816-2015). https://ssrn.com/abstract=2463244 accessed at 30 September 2018.

55 Ibid. Nikolas Aletras et. al. (2016)

56 Ibid. considering that "[authors] presented the first systematic study on predicting judicial decisions of the European Court of Human Rights using only the textual information extracted from relevant sections of ECtHR judgments. [Authors] framed this task as a binary classification problem, where the training data consists of textual features extracted from given cases and the output is the actual decision made by the judges."

judgment for the judge to review. These tools already exist[57] so there is a potential to adapt this technology to judges' work as well. Thus, especially in routine cases, judges could rely on the algorithmic draft decisions instead of routinely going through a lot of documents and communications with litigants.

3.2 THE USE OF AI IN COURTS – RISK ASSEMENT TOOLS

Across the U.S., judges, probation and parole officers are increasingly using "risk assessment" algorithms to assess a criminal defendant's likelihood of becoming a re-offender. How does these AI-driven risk assessment tools work? The basic idea of the tool to give judges the most objective information available to make fair decisions about prisoners. However, these algorithms are dependent on the information they use which might cause problems in case the data itself is biased.

There are three main risk assessment systems that are most widely used in courts in U.S.: Correctional Offender Management Profiling for Alternative Sanctions (COMPAS), Public Safety Assessment (PSA) and Level of Service Inventory Revised (LSI-R). COMPAS, assesses variables under five areas: criminal involvement, relationships/ lifestyles, personality/attitudes, family, and social exclusion. COMPAS scores each defendant ranged from one to ten, ten being the highest risk. Algorithm provides the score which is based on a set of questions defendants answer.[58] COMPAS is used e.g. in state of Florida and Wisconsin to help judges decision-making in assessing the risk of the

57 See e.g., *CARA*, Casetext, https://casetext.com/ accessed at 30 September 2018. This tool is developed by Pablo Arrendondo.

58 Jeff Larson et. al., 'How We Analyzed the COMPAS Recidivism Algorithm' (2016) ProPublica https://www.propublica.org/article/how-we-analyzed-the-compas-recidivism-algorithm accessed at 30 September 2018.

080 defendant's tendency to commit further crimes.[59] Also, the LSI-R uses information from a wide set of factors, concerning criminal history and personality patterns. The PSA, on the other hand, uses a narrower set of variables, and only considers factors related to a defendant's age and criminal history.[60] Interestingly, these algorithms are not subject to state or federal open government laws since they are proprietary.[61] A question is how much courts should rely on these algorithms? Since these algorithms are already used widely in courts, it might be hard for a judge not to rely on them. After all, U.S. criminal justice systems have used math to guide decision-making for approximately a century.[62] In general, these tools save judge's valuable time and provides answers regarding defendants' bail decisions in less time assuring a speedy process.

Accuracy of algorithmic bail decision could at least in theory reduce the crime rate since judges do have tendency to some amount of mispredictions. According to a recent study conducted by National Bureau of Economic Research (NBER), AI algorithms are more accurate – and more fair even – than human judges. Thus, use of them in the court system "could be able to reduce the crime rate by 24.7%. Alternatively, we could hold the crime rate constant and reduce the jail

59 Ellora T. Israni, 'When an Algorithm Helps Send You to Prison' (2017) N.Y. Times https://www.nytimes.com/2017/10/26/opinion/algorithm-compas-sentencing-bias.html accessed at 30 September 2018.

60 Electronic Privacy Information Center, 'Algorithms in the Criminal Justice System' https://epic.org/algorithmic-transparency/crim-justice/.

61 Ibid.

62 Jason Tashea, 'Risk-assessment Algorithms Challenged in Bail Sentencing and Parole Decisions' (2017) ABA Journal http://www.abajournal.com/magazine/article/algorithm_bail_sentencing_parole accessed at 30 September 2018.

[population awaiting a trial] from 26.4% to 15.4%, a decline of 42.0%".[63] Repeating the experiment on data from 40 large urban counties across the U.S. yielded similar results. Interestingly, the research found that use of those algorithms was shifting the jail population to include a smaller proportion of African-Americans and Hispanics – NBER study demonstrates how a judge-advising algorithm could reduce crime as well as the rate at which blacks and Hispanics are jailed.[64]

Hence, AI seems like a perfect tool for decision-making in courts. However, do we know that the machine is getting correct results?[65] Further question is, can we think of ourselves living a world where a machine can decide over individual's freedom? These are some of the challenges of using AI in courts. AI and machine learning are based on the inputted data and recognizing patterns and learning through that data. Data processing always includes the problem of possible biased data that is affecting to the outcome of the processing. To what extent can we rely on these algorithms? Are we able to reach algorithmic fairness in a way that we could utilize AI to mitigate human failures? AI is yet not perfect and has its benefits and challenges.

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63 Jon Kleinberg et. al., 'Human Decisions and Machine Predictions' (2017) National Bureau of Economic Research (NBER) Working Paper Series, 16 https://www.cs.cornell.edu/home/kleinber/w23180.pdf accessed at 30 September 2018.

64 Ibid. See also Tom Simonite, 'How to Upgrade Judges with Machine Learning' (2017), MIT Technology Review, https://www.technologyreview.com/s/603763/how-to-upgrade-judges-with-machine-learning/ accessed at 30 September 2018.

65 Mireille Hildebrandt, 'Law As Computation in the Era of Artificial Legal Intelligence. Speaking Law to the Power of Statistics' (2017) https://ssrn.com/abstract=2983045 accessed at 30 September 2018. See also Danielle Keats Citron & Frank A. Pasquale, 'The Scored Society: Due Process for Automated Predictions' (2014) 89 Wash. L. Rev., 1.

3.3 BENEFIT AND CHALLENGES OF AI – MORE OBJECTIVE DECISIONS OR FALSE JUDGEMENTS

Humans are not perfect. Surprising things can affect to outcome of the judges' decision-making process such as their energy-levels and mood in general as well as other human failings that machines do not encounter.[66] Furthermore, human ideologies and values may have influence on the judgement which is undesirable in an impartial court system.[67] In light of NBER statistics presented above, AI could mitigate these errors especially regarding fairness. In addition, AI is more efficient than judge. AI has ability to act autonomously which means that "AI program can search through many more possibilities than a human in a given amount of time, thus permitting AI systems to analyze potential solutions that humans may not have considered, much less attempted to implement."[68]

However, AI and machine learning algorithms are not only recognizing patterns but also developing themselves – which makes

66 Alex Kozinski, 'What I Ate for Breakfast and Other Mysteries of Judicial Decision Making' (1993) 26 Loy. L.A. L. Rev. 993.
67 *Watney* (n 4).
68 Matthew U. Scherer, 'Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies' (2016) 29 No. 2 Harv. J.L. & Tech., 353, 363–364.Scherer is talking about regulating AI and how legal system is falling behind of technological development.

it problematic to understand the produced outcome.[69] Can a court rely on that outcome of AI's decision? If the algorithm is hidden, how can the result be checked or re-evaluated?[70] How can we ensure the interpretability, transparency, and predictability in court's decision-making process and that a judge is understanding the algorithm and able to validate its outcome and build a fair reasoning to the parties? In judicial decision-making, human supervision is always needed and furthermore, it is seen morally undesirable to allow computers make judgements.[71] Understanding of the algorithm and reasoning of a case's outcome must be given great importance. Although, humans can forget facts and make mistakes, human intelligence is still superior

69 *Hildebrandt* (n 65) 9. *"This brings us to the sub-discipline of machine learning (ML), that is the use of computing systems to detect patterns in data that allow a system to update its own program. The idea is simple: to reach its goals the system must reduce uncertainty about the effects of its own behavior. To reduce such uncertainty it probes its environment and processes the feedback, reconfiguring its processing algorithms until its goal is reached. Here we return to mathematics, though not to encryption. ML seeks to infer correct mathematical functions to describe patterns in a data set, or between given input data (for instance data on speed or brake behavior), and given output data, for instance machine readable 'safe driving behavior' for an autonomous car. The result is a set of – potentially reconfigured - instructions that produces desired behavior of the system."*

70 Jason Tashea, 'Courts Are Using AI to Sentence Criminals. That Must Stop Now' (2017) Wired https://www.wired.com/2017/04/courts-using-ai-sentence-criminals-must-stop-now/ accessed at 30 September 2018.

71 *Lodder & Zelenikow* (n 8).

to machine intelligence in complex legal system due to its creativity to "go beyond existing formal rules".[72]

Although AI is a useful tool for judges, developing algorithms for courts has not been so straightforward, and interpretability of the algorithm may cause concerns. In the case Wisconsin v. Loomis[73] COMPAS algorithm defined defendant Eric Loomis as a "high risk to the community" while he was charged with driving a stolen vehicle and fleeing from police. Loomis claimed that the use of algorithm was violating his right to due process since it was using gender as a factor and he was not allowed to assess the algorithm. However, the Supreme Court ruled that the use of the COMPAS risk assessment at sentencing did not violate defendant's right to due process and reasoned that knowledge of the algorithm's output was a sufficient level of transparency – reasoning of the Supreme Court does not give rules governing how AI risk assessment tools should be examined during trial:

> *"This is a worrisome precedent as risk assessments evolve from algorithms that are possible to assess, like COMPAS, to opaque neural networks. Neural networks, a deep learning algorithm*

72 *Engle* (n 3) *"While formalization does implicitly reveal the theoretical shortcomings of contemporary legal theory, one cannot predict what new theory or theories would emerge. This is because the formalization underlying the computer program itself reflects meta-theoretical assumptions. In this regard, human intelligence is, at present, clearly superior to machine intelligence. Although humans, unlike computers, often forget facts or make mistakes, they are capable of synthesizing theories that creatively go beyond existing formal rules of production to generate new ones. They are able to apply abductive, intuitive, and aleatory operations that are not part of the basic instruction set of a CPU."*

73 *Loomis v. Wisconsin* 137 S. Ct. 1240 (2017).

meant to act like the human brain, cannot be transparent because of their very nature."[74]

Also, ProPublica found that algorithms which courts in U.S. are using for criminal sentencing gave biased outcomes and resulted racial disparities.[75] Although, these algorithms do not explicitly use race as an input, blacks were more likely to be labeled as risky and on the other hand whites got a low risk rate. However, those results do not prove the algorithm itself is biased. Classifications are based on recognized risk factors such as a documented history of violence which are giving biased outcomes. Thus, it is misleading to blame the algorithm while it is only uncovering real statistical patterns that need to be fixed in the society.[76] However, more research is needed into how to ensure that criminal justice algorithms do not lead to unfair outcomes.

Another aspect of using machine learning or AI in courts relates to the nature of common law and Anthony D'Amato argues that one of the costs of using AI in courts will be a freezing of the precedents. The common law will not develop under a computer regime; rather, all new cases will be decided according to exactly the previous case history, and the new decisions will not add to the body of case law because they will simply reflect the previous cases.[77] Furthermore, challenge of AI relates to the fact that the use of these algorithms is not yet

74 *Tashea* (n 70).

75 Julia Angwin et. al., 'Machine Bias' (2016) ProPublica,= https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing accessed at 30 September 2018.

76 Sam Corbett-Davies et. al., 'Even Imperfect Algorithms Can Improve the Criminal Justice System' (2017) N.Y. Times, https://www.nytimes.com/2017/12/20/upshot/algorithms-bail-criminal-justice-system.html accessed at 30 September 2018.

77 Anthony D'Amato, 'Can/Should Computers Replace Judges?' (1977) Faculty Working Papers, Paper 129, 15 http://scholarlycommons.law.northwestern.edu/facultyworkingpapers/129 accessed at 30 September 2018.

regulated. Currently, there's no federal or state law for implementing risk-assessment or any other AI tools nor standards for testing their validity.[78] Regulation will be needed to make sure that judges know what the AI program is doing – in order that they can provide well-reasoned outcomes. Although, AI is yet unstable, AI has a lot of potential and failures of AI cannot be a too big barrier for the use of AI in courts.[79]

In conclusion, could AI be suitable solution to the access to justice crisis? Access to justice does not only mean speedy trials but also fair proceedings. Congestion is a problem to access to justice, but fairness cannot be compromised as a price of efficient proceedings and decision-making through AI. Thus, these studies are vital in the process of adopting AI algorithms and decision-making to courts. However, public policymakers have found these algorithms improving public safety. There are also studies showing that optimizing public safety leads to some amount of racial disparities and on the other hand, satisfying fairness means also releasing more high-risk defendants.[80] On the other hand, a judge can rule more strictly than the algorithm as aforementioned NBER study concluded. Consequently, use of these algorithms can after all promote fairness.[81] So, how can we promote

78 *Watney* (n 4).

79 Dave Orr, Senior Project Manager at Google, speech 'A.I. and The Future of Online Dispute Resolution', at Santa Clara Computer & High Tech. L.J. Symposium, Legal Bootstrapping – The A.I. Tools Lawyers Need, Computer History Museum, (4 April 2018). As Dave Orr said well in the symposium: if AI is not getting it right for the first time it does not mean we will have to give up, but we need to train the data more and better.

80 Sam Corbett-Davies, Emma Pierson, Avi Feller, Sharad Goel, and Aziz Huq, Algorithmic Decision Making and the Cost of Fairness. In Proceedings of KDD '17 (2017) Halifax, NS, Canada. DOI: 10.1145/3097983.3098095. Article available at: https://5harad.com/papers/fairness.pdf accessed at 30 September 2018.

81 Jon Kleinberg et. al. (n 63) 5.

both fairness and public safety in through AI algorithms? Wisconsin v. Loomis highlights the pain point – judges must be able to understand and explain the outcome of AI. Further, defendants should be entitled to contest the fairness.

4 THE FUTURE OF AI IN THE COURT SYSTEM

Above I have discussed the qualities of AI and how it could help judges' in their decision-making process. In this section, I will focus on concrete AI-driven tools and opportunities for court systems and ADR that could reduce the congestion and backlogs in courts. I am presenting some AI-driven tools for judges that would make justice more accessible to the public while reducing court congestion by making judges work more efficient: AI-driven ODR, and case assessment and management tool. As discussed above, cheaper and more accessible means to enter court may end up causing even more backlogs and congestion if we do not provide technology tools for judges as well. Therefore, possible ODR systems that are adopted to courts could also include case management and AI-driven negotiation support tools for the parties to make judges work faster and maybe even easier.

What is the way forward? Adopting AI and ODR to the court system is a long process which takes time and resources to plan and execute.[82] As discussed above, currently used risk assessment tools would need more evaluation, testing, and regulation around them to ensure fairness of the outcomes of these tools. Regarding ODR platform, courts need to choose whether they want to build it in house or buy it as a cloud service. The problem is that courts tend to build tailor made systems for themselves that fits their needs which at the same time slows down

82 *Tashea* (n 70).

088 the development. Also, if courts want to build a sophisticated AI-driven ODR they face considerable costs, adding costly updates. However, technology is getting cheaper, and according to HiiL report on ODR and the courts, cost of well-designed ODR would be 500,000 EUR or even less.[83] According to the same report, the average annual spending on IT for courts e.g. in EU member states is just 3% of court budgets, totaling 33 billion EUR. Thus, required economical investments are attainable. According to the report, this 1 billion IT budget would only need to be increased some amount to make adopting ODR systems possible.[84]

4.1 COMBINING AI AND ODR – PROVIDING MORE ACCESS TO JUSTICE

An effective ODR system will serve litigants to efficiently connect courts. Judge's role would not be diminished, but judges would retain in-person, face-to-face judicial consideration, and would receive the information they need to decide an issue accurately. Thus, judges would have more time to focus on the hard part of judging that cannot be automatized. Furthermore, judges can improve the quality of the outcomes when they are less congested and have less time pressure.[85] As mentioned, ODR can be used both in ADR and in courts. ADR processes are less regulated and more informal which is why there is a lot of potential to adopt AI-driven ODR to mediation. However, also courts would benefit from this technology in routine civil matters that does not require judges' experience and hard work.

83 *HiiL Trend Report* (n 23) 68–69.
84 Ibid. 12.
85 *Bulinski & Prescott* (n 40) 244.

How does AI-driven ODR work and what does it mean? One option for ODR is to create an AI-driven ODR system with a three-step model which is designed to be used in pre-trial ADR such as negotiation and mediation.[86] As a suggestion, Lodder and Zelenikov have introduced a theory of three-step negotiation method that, through utilizing AI, first, provides feedback on the possible outcomes of the dispute if the negotiation were to fail – task is to find the "best alternative to a negotiated agreement" (BATNA). Secondly, the tool should try to resolve any existing conflicts using argumentation or dialogue techniques. Third, the tool should employ decision analysis techniques to facilitate resolution of the dispute if those issues are not resolved in step two.[87] System promotes parties to resolve their dispute on their own which reducing the role of the judges in a particular dispute.

Lodder and Zelenikow also introduce an idea of intelligent decision support which is based on machine learning.[88] In general, decision support tools help decision-makers, i.e. judges for example, improve their performance.[89] AI's strength in decision support is especially in machine learning, neural networks and data mining: a problem-solving methodology that finds of patterns and regularities in the set of data e.g. how judges have ruled in similar cases before.[90] Due to AI's qualities of recognizing patterns and natural language processing opportunities, AI could go through the existing precedents and evidence in a certain civil dispute. As an outcome, AI would suggest a BATNA for the parties and options to choose whether to settle for that outcome or proceed to

86 *Lodder & Zelenikow* (n 8).
87 Ibid.
88 *Lodder & Zelenikow* (n 36) at 86.
89 Ibid. 86–87.
90 Ibid. 88.

court.[91] This could bring essential value since judges could focus more on the hard cases instead of routine civil disputes: finding a BATNA facilitates the parties decision whether to proceed or settle.[92]

How does AI help to find BATNA? I am using Lodder and Zelenikow's discussion about family law disputes as an example: they introduce the Split-Up system concerning distribution of property in case of divorce under Australian law. System identifies almost fifty variables as relevant factors for a determination in consultation with experts. These variables were extracted from previously decided cases regarding family law – a neural network could learn to mimic the way in which judges had combined these variables i.e. came to certain conclusion. These variables along with arguments provided by parties are fed to the machine learning program such as neural networks so that machine learns how to weight these different factors such like a judge would do. As an outcome, the Split-Up system shows first to parties what they would be expected to be awarded and moreover, the litigants are able to have discussion on possible solutions through Split-Up.[93] This technology can be implemented to other disputes as well, including criminal justice. Inputting certain facts or arguments regarding the case while defining variables related to a specific field of law, specific disputes, and related case law, a neural network can be trained in a way that it establishes BATNA to the parties. This kind of a negotiation support tool or AI-driven ODR would be very beneficial to ADR and would promote settlement between the parties and thus, reduce the amount of cases that goes into trial.

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91 Ibid. 147–148. "Calculating one's BATNA is an important step in the decision as to whether go to court or to mediate – in family law, commercial disputes and even in criminal law."

92 *Lodder & Zelenikow* (n 8) 326.

93 *Lodder & Zelenikow* (n 36) 111–115.

Similar AI-driven ODR system could also be adopted to court trials. Most of the civil cases in courts are mainly routine matters that AI could easily solve. For example, most of the cases in U.S. State Courts are traffic violations cases.[94] These are usually quite straight-forward but they take a lot of judges' time. Furthermore, for example in traffic violence cases, with access to data assembled by government or industry as well as information collected from the platform itself, an ODR system can provide insights about litigant behavior. Predictive algorithms may give judges and decision-makers information regarding correlations between litigant characteristics and legally relevant outcomes through patterns in data. Judges could choose whether they use these relationships to inform their thinking and decision-making.[95]

AI-driven ODR could also make court proceedings more objective and increase judicial accuracy because the system would eliminate distorting, irrelevant information from the process through better organized information.[96] Thus, e.g. by removing from view factors such as race, gender, weight, age, or socioeconomic status when they are irrelevant to the legal issues before the court, ODR would make it easier to judges to focus on the judicial facts and information without unconscious prejudices humans tend to make. However, the value of human interaction shall not be underrated and the risks, such as possible failures of algorithms discussed in the section 3.3., must be considered. There are still many challenges regarding the use of AI in courts. The solutions to make courts more efficient should not lead to injustice and false decisions.

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94 National Center for State Courts, 'Court Statistic Project' (2016) http://www.courtstatistics.org/~/media/Microsites/Files/CSP/National-Overview-2016/EWSC-2016-Overview-Page-5-Table.ashx accessed at 30 September 2018.
95 Bulinski & Prescott (n 40) 246.
96 Ibid. 211.

092 Adapting new technology such as AI to courts is not an easy path – implementing technology to government systems is always complicated. However, proper planning of new systems is vital, especially in regard to court systems. Referring to Dave Orr speech in AI symposium one of the most important steps is training the datasets repeatedly until it is reaching the desirable and accurate outcome with the input data. After training the data, it is important to start very narrowly i.e. with smaller cases such as civil disputes or small claims. Next step is to ensure the interpretability meaning that judges have the knowledge of how these algorithms are working. Lastly, explainability of the outcome plays important role in judge's reasoning and thus, the parties understand judge's ruling and are convinced that it is fair.[97]

As said, ODR could reduce some barriers when accessing courts that can be as simple as resolving the issue of not having a proper transportation i.e. physical opportunities and access to the court house as a place.[98] AI-powered ODR system is most probably not going to replace lawyers, legal services, or legal aid, but however it would especially empower the court – i.e. judge – to communicate more clearly with defendants about law and their rights through ODR platform.[99] That is, this solution would simply enable judges and court personnel to handle cases more quickly and accurately which will maintain the moral responsibility on judges.[100] We will still need judges who are in charge and have the legal education in judging. As Bulinski

97 *Orr* (n 79).
98 Ibid. at 223–225.
99 Ibid. at 221.
100 Ibid. at 213. *"Ultimately, an [ODR] system is not meant to replace the existing system, but rather to modernize it in at least two ways: (1) by expanding access options to include those made available by Internet technology and (2) by augmenting the abilities of judges and increasing the bandwidth of court personnel, thereby enabling them to handle cases more quickly and accurately."*

and Prescott address in their article that one potential concern with using an intelligent ODR system to resolve cases is the possibility that a computer algorithm might be making the decisions and cases might become automated without a judge being in charge. Although, we would not need judges to announce routinized solution to a routine case, we will need judges when a case requires wise ruling. Correspondingly, AI can be a part of that decision-making process making it more efficient and maybe even more accurate meaning, however, that the control will remain in judge's hands.[101] This leads us back to one of the key points of using algorithms in courts – interpretability. Training judges to understand these algorithms and the possible bias that may occur has a high importance not to be ignored.

4.2 CASE ASSESSMENT AND MANAGEMENT TOOLS

Case management – i.e. managing all the information related to a case – is important part of the judge's work. Due to the quality of ODR being fully online in the first place, AI could go through all the evidence and case information more quickly. As discussed above AI's strengths are in recognizing patterns and going through vast amounts of data in no-time. Computers accomplish repeated tasks very well, so using ODR systems to address case types that occur frequently such as small civil claims and disputes would be practical.[102] This brings essential advantages for managing cases and their information. Nowadays, more information is in electronic form which also makes it easier for individuals and lawyers to drown judges to case information and evidence. More data means more materials to go through and more

101 Ibid. at 240–41.
102 Ibid. at 217.

information management. Due to AI's qualities, a case management platform build into the AI-driven ODR, would give a judge tools to search and organize information on this platform.

To support judge's decision-making process, a case assessment tool would use case prediction algorithm through NLP and machine learning. If parties do not settle for the BATNA, a judge still can use that as a basis of her reasoning. By submitting the facts of the case to this case assessment tool that is functioning correspondent to case prediction through NLP discussed above, a judge would get an idea of the possible outcome of the case. This gives a judge more perspective to his own thinking and possibility to recognized whether his thinking is biased. Eventually, the final decision of the judgement will remain in judge's hands. Case prediction would be one part of the process focusing on diagnosis of a problem and selection of an action – implementation of that action will remain to decide with judge's legal experience in judging.[103]

5 CONCLUSION

This Article has considered machine learning, AI-driven tools such as risk assessment algorithms, ADR and ODR through the lens of access to justice. I have considered the use of AI-driven ODR as a tool to reduce court congestion and facilitate judges' workload in routine civil matters. AI-driven ODR also gives opportunities to judges to manage information and cases more efficiently, and ease the decision-making process in routine cases, leaving more time to focus on the hard ones.

103 *Lodder & Zelenikow* (n 36) 86. "The process of decision support may generally be considered as divided into three steps: 1) diagnosis of a problem; 2) selection of an action; and 3) implementation of that action." AI would be helpful in terms of diagnosis of a problem as well as selection of an action.

There are some disadvantages of use of AI as a replacement of judging. For example, computers are not able to articulate the diverse emotional states of human beings, or conceptual creativity and flexibility which are beyond current scope of computers, and there is a danger or worry that existing skills of judges will shrivel while delegating tasks to machines.[104] The danger is that judges – like all people – may find it easy to drop their own critical thinking skills when presented with what seems like an easy answer. Furthermore, there are many concerns of using bias algorithms in courts and avoiding these bias in algorithmic decision-making will take time and planning. Although, the idea of robojudges might be technically possible but still very unlikely – at least in near future. Judges will still bear the moral responsibility of their judgements and the education of judges plays also important role when adopting any new technology to court system.Technology, such as AI, can bring many benefits to the court system by making processes more efficient and faster. However, finding the right balance of AI and human interaction in the court system will be a difficult task. Judges may be resistant to change, and we will need systems and institutions that ensure proper transparency, just, and speedy process. Judgements must be reasoned, transparent and fair equally to both parties. It is important to reduce false data to ensure the quality of AI results. When applying AI in courts, it must be able to explain how it reached it end result. We can agree that AI will not replace lawyers and certainly not judges. However, when using AI and machine learning in judges decision-making process, not only is access to justice likely to be increased, but economic impacts are anticipated to occur as well. If

104 See generally, Santosh Shah, 'Will Lawyers and Judges be Replaces by Artificial Intelligence (AI)' (2017) LiveLaw.in, http://www.livelaw.in/will-lawyers-judges-replaced-artificial-intelligence-ai/ accessed at 30 September 2018.

judges would be able to solve cases faster with assistance of AI, courts would most likely to be less congested and backlogged. Also, ADR means utilizing AI, promote less court and lawyer-intensive solutions to solve cases meaning less congestion. According to this research, it seems clear that use of AI and ODR combined will provide more access to justice, reduce delays and congestion in courts. Furthermore, when risk assessment algorithms develop further diminishing their possible bias and towards better transparency, there is a major opportunity in making criminal justice more fair and just through use of these algorithms. I will wait eagerly, how and when AI will be adopted to the court system.

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III

Law at Intersections of Information, Innovation and Technology

SARI KORHONEN & ALTTI MIEHO[1]

Smart Legal Information Services

LEGAL INFORMATION SERVICES IN FLUX

Similarly to almost every other area of business, and as a self-evident starting point for the audience of this publication, the landscape for legal information services is undergoing a substantial change. Both technological advancement and expectations in demand are altering the playing field. Now is the time, and real need, for buzzwords like Legal Tech and Legal Design to come fully alive.

Changes taking place in the field of legal information services fit to a larger image of digitalization and disruption. However, legal information services, and legal services in general, have their own peculiarities due to which adoption of new technologies and new ways of working have been somewhat different compared to some other fields of business.

Legal publishers have traditionally had a significant part in delivering the information about laws in force and about their interpretation.

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Recently, their role has been in flux. Mere production of content has transformed into something else. In addition to focusing on content production, it is now also about tools and solutions, which enable lawyers and other professionals to perform tasks more efficiently.[2]

Technology opens new opportunities, among other things, in relation to how legal content is produced, updated, combined with other relevant content, presented and, of course, consumed. Legal content becomes more relevant and more accessible through technology, which is great news for everyone. On one hand, solutions for lawyers can help them to be more productive and efficient. On the other hand, improved access to legal information facilitates access to justice, which in turn is important to everyone as a critical part of rule of law.

In order to understand the overall importance of legal information, we should focus on the value it creates and what kind of challenges are ahead to utilize legal information in a better way. This would also allow us to conceptualize something called "smart legal information". Brief look below on how legal information is construed and delivered to public and professionals reveals some of the practical challenges and complexities that publishers and content producers aim to solve.

CONTENT AS PART OF SOLUTIONS

Access to legal information is essential in a democratic society. We are bound by legislation - our politically found rules that we all need to follow and have knowledge of. Right to binding legal information is

2 This is well described by David Curle. 'Today HOW is the new WHAT'. Curle, David: *Legal Publishers, Legal Technology, and the New Legal Landscape* p. 189 – 197 in Hartung, Gues, Halbleib, 'Legal Tech – how Technology is Changing the Legal World, A Practitioner's Guide' Verlag C.H. Bech oHG 2018.

rarely under debate. However, the manner in which legal information should be delivered to the public is a more complicated question. Legal texts tend to be very complicated themselves and especially due to the sheer amount of legal information typically it is very difficult even for a lawyer to be completely sure about particular legal question – let alone laymen.

The content of legal information has its impact on all aspects of life. In order to understand the practical implications, one has to go way beyond statutes, which provide merely a starting point. However detailed and specific a law aims to be, at some point its wording requires interpretation. Legal information in its broad meaning may involve significant amount of different texts and verbal advice from varying sources. People need easy access to reliable legal information to be able to make informed decisions and in order to be able to achieve results they are after based on those decisions.

For decades, we used to get most of this information in written form on a paper. Law books became essential source of legal information and tools for keeping professionalism up to date. For numerous reasons, books are still a valued and useful channel for distributing legal information but the way we use and distribute legal information has substantially changed. Content producers and new legal information service providers are key players in the utilization of modern digital solutions.

The expectations for the use of legal information and for those who provide it have changed. In addition to delivering the information about legislation and interpretation, it is essential to consider how this should be done – and most importantly why. There is a real need for better tools at every stage of the “process”. Legal publishers are in this respect well positioned to facilitate the interaction between

the legislator, legal professionals and everyone influenced by legal information.

Since we are living in an era of information overflow, legal information producers have more important role than ever. The increasing amount of information makes it crucial to create reliable and time saving solutions. This is why legal information services have significant role to play in the development of the whole Legal Tech scene. Consequently, legal publishers and legal information service providers are transforming from content publishers to solution and platform providers. This is to say, smart legal information services.

CHANGES AS A RESULT OF THE APPLICATION OF DIGITALIZATION

When people refer to digital content it is not always clear what they mean by it. In relation to legal information services, certain elements can be categorized based on the type of exploitation.

While at first glance it would seem that digital legal content is static and easy to define, in practice this has changed over time. What we perceive as digital legal content or information has gradually become different based on the way the content is utilized by its users. There are three clear stages that have emerged in practice, and currently we are in transition from the second to third stage. This will have major implications in the way we use and understand legal content.

In the first stage, we started to convert legal information into digital format. For a long time, the digital format was only a parallel channel for conveying traditional legal information. The length of documents ceased to be a problem, search functions made life easier and linking

of different types of content created added value compared to books. However, digital format was, and in many respects still is, just a digital extension of manual content production. Legal information has been consumed by reading it and then mainly manually applying it somewhere else.

As with most digitalization processes, at some point most of the legal information had been digitalized. This meant that there was a transition to the second stage, when there was a need for linking different pieces of legal information together. Presenting relevant legal information in context, in the way that regulatory change management can be conducted in same service platform where legal information is provided, brought wider opportunities for using metadata and structured data and for developing advanced user experience. The better quality of data in legal information services and structured data enable higher value to the end-users. The better and more structured the data on the background is, the better value the solutions build on that foundation can have.

In the third stage, where we are currently transitioning to, we have started to enable computers to use and enrich legal information. Many new ways of utilizing legal data has been developed, most of which seems to aim at providing new tools for people to use with the help of automatic or semi-automatic digital solutions. For example, automatic linking to other relevant content, recognizing similar cases or automatic anonymization of content with sensitive personal data means new opportunities for legal information services and their users.

MACHINE READABLE AND LINKED DATA IN LEGAL INFORMATION

When we look at legal information from the legal perspective, the most important element is the actual content. From this angle, a piece of legal information has its intrinsic value while format is of secondary importance. We are typically focusing on the literal text of legal content. However, when we look this from a different perspective, such as digital perspective, we notice that the content is heterogeneous and produced by using varying tools, data formats, and practices[3].

The exploitation and further development of digital format in legal information naturally requires, at the very least, that the information exists and is available in digital form. Moreover, it should be preferably in a format which is convenient to use – hence the ongoing discussions of legal design are extremely appreciated. When we talk about using the information it is important to differentiate between different purposes. For example, should the information be understood and used by humans, by computers or perhaps by both?

Transformation to digital has not been an easy one. To make some highlights of the relatively recent development we can use laws as an example. *Statutes of Finland* is the official publication of Finnish Law. Until the beginning of 2011, the authentic versions of laws were the ones published in the printed publication. The online versions were already available but did not have the authentic status.

Today, online versions are published in Finlex, a database of up-to-date legislative and other judicial information of Finland. The dataset

3 Matias Frosterus, Jouni Tuominen, Mika Wahlroos and Eero Hyvönen: The Finnish Law as a Linked Data Service. *The Semantic Web: ESWC 2013 Satellite Events*, pp. 289-290, Springer-Verlag, Berlin Heidelberg, Montpellier, France, May 26-30, 2013.

of original legislation consists of approximately 47 000 acts and decrees as they originally appeared in the Statutes of Finland publication. This includes new acts and decrees as well as amendments and repeals targeted on previously enacted statutes.[4] This amount of data is not particularly usable as it is. However, this is the law that everyone is expected to follow. The problem is that in order to find the current piece of legislation, in theory the user should manually combine all the amendments of a particular act or decree.

There have been different means to tackle this problem. Earlier solutions for this challenge have included especially consolidated legislation, which includes consolidated texts of acts and decrees that incorporate their successive amendments. This is to say that original statutes and subsequent legislative amendments are merged into one consolidated version for convenience reasons, and it is the approach for example the European Union follows in its regulations and especially in principal treaties with multiple amendments over time. This Consolidating legal information requires a significant amount of editorial work. However, while in theory the consolidated statutes in Finland do not have official status, this is the only presentation most people find usable and therefore is utilized in Finland.

Finlex has been created for human use. This means that the information has not been available as data for algorithmic analysis and applications to use. Legislation is published as HTML documents, which is not very practical for most software to use. To improve the situation and make regulations machine readable, Semantic Finlex was built. Semantic Finlex is a national in-use data resource and system

4 Oksanen Arttu, Tuominen Jouni, Mäkelä Eetu, Tamper Minna, Hietanen Aki and Hyvönen Eero: *'Semantic Finlex: Finnish Legislation and Case Law as a Linked Open Data Service'*. Proceedings of Law via the Internet 2018 (LVI 2018), Knowledge of the Law in the Big Data Age, abstracts, pp. 271, Florence, Italy, October, 2018.

for publishing Finnish legislation and related case law as a Linked Open Data service with applications. Data from the Finlex database is transformed and interlinked on a regular basis into Linked Open Data.[5] Semantic Finlex was launched at 10th of March 2016.

Semantic Finlex has a possibility to be beneficial in many new use cases, such as building more intelligent digital legal services and conducting research into legislation and legal practice. Presenting legislative documents in a form that enables interpretation by a computer can help with the development of new intelligent applications. For example, legal texts can be automatically linked to other related texts, case law and vocabularies of legal terminology.[6] This is something that is currently mostly done by manual work.

LEGAL INFORMATION FROM PEOPLE TO PEOPLE

Publishing of legal information is about to enter new era as the third stage of digitalization of legal information is happening. Digital solutions provide us with options that were not available earlier. Not only are we now asking 'Can we do it?' but we have started to follow this with another question, 'Should we do it?'. This question is continuously raised especially in connection with Artificial Intelligence. Legal information cannot, and should not, be excluded from these discussions.

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5 Oksanen Arttu, Tuominen Jouni, Mäkelä Eetu, Tamper Minna, Hietanen Aki and Hyvönen Eero: *'Semantic Finlex: Finnish Legislation and Case Law as a Linked Open Data Service'*. Proceedings of Law via the Internet 2018 (LVI 2018), Knowledge of the Law in the Big Data Age, abstracts, pp. 271, Florence, Italy, October, 2018.

6 Oksanen Arttu, Tuominen Jouni, Mäkelä Eetu, Tamper Minna, Hietanen Aki and Hyvönen Eero: *'Semantic Finlex: Finnish Legislation and Case Law as a Linked Open Data Service'*. Proceedings of Law via the Internet 2018 (LVI 2018), Knowledge of the Law in the Big Data Age, abstracts, pp. 271, Florence, Italy, October, 2018.

New questions are actively solved in sphere of legal information as well, and we can illustrate this with the utilization of court cases to understand more holistically the use of law in Finland. For example, prior to the General Data Protection Regulation[7] thousands of selected court cases had been made available to the public via Finlex. These court cases needed to be anonymized for further publishing. Anonymization means a process where explicitly or implicitly identifying details of persons and companies are removed from the text.

Edita Publishing Ltd estimated that - even if the time varied notably - it takes approximately 38 minutes to manually anonymize one decision on average. There were different parts in the anonymization process of a single case and included for example familiarization to the case, which took roughly 20 minutes per document. It is thus a relatively time-consuming process. While this was possible to do for selected cases, it would be very burdensome task to complete on a larger scale.

One key challenge with automatic anonymization tools is for example the difficulty of evaluating the sufficiency of the anonymization for different kinds of data and needs. Also, a service or tool for this anonymization purpose has to handle both Finnish and Swedish language texts properly. For solving these problems, Ministry of Justice with its partners[8] started a process of creating a semi-automatic tool for Finnish and Swedish, which could eventually be utilized in anonymizing court cases on a larger scale.

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7 Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) (Text with EEA relevance) *OJ L 119, 4.5.2016, p. 1–88.*

8 Aalto University, HELDIG – Helsinki Centre For Digital Humanities and Edita Publishing Oy.

This anonymization application is designed to consist of two separate software components: a web service and a user interface. The web service will comprise a functionality that takes text as input and produces as output the same text annotated with special tags marking the occurrences of named entities in the text. The user interface, a web-based WYSIWYG (What You See Is What You Get) editor, enables the user to edit made suggestions and add or delete new ones. The occurrences of selected named entities are then substituted with pseudonyms (such as 'person A'). After finished editing, an anonymized version of the document can be exported.[9] This process is expected to be helpful in anonymization of the court decisions. The tool should perform faster than a person doing manual anonymization. However, it will do mistakes and is only useful helping professionals in the process. Sufficient and reliable data is essential especially for the development of artificial intelligence and machine learning. Anonymized data means better availability of information. This is great news for both business and academia, but also for the common people and the society.

Digitalization and new legal information services do not only mean new efficient tools and solutions for professionals, but they also have an impact of empowering individuals. This is what smart legal information services is all about. Easy access to reliable relevant legal information and a chance to interact and take action on the basis of that information. Despite all the technical capabilities we may have or gain, it is still people in communities and organizations we are doing this for.

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9 Oksanen Arttu, Tuominen Jouni, Mäkelä Eetu, Tamper Minna, Hietanen Aki and Hyvönen Eero: *'Semantic Finlex: Finnish Legislation and Case Law as a Linked Open Data Service'*. Proceedings of Law via the Internet 2018 (LVI 2018), Knowledge of the Law in the Big Data Age, abstracts, pp. 271, Florence, Italy, October, 2018.

ANETTE ALÉN-SAVIKKO[1]

Exploring News Automation – Notes on Transparency and Copyright

I started my Science Pitch by referring to history and continuity, by acknowledging how the media has always been closely intertwined with technological development whether we talk about the print media or broadcasting. The media has also resorted to computers for decades ranging from computer-assisted reporting and data journalism in late 20th century to computational journalism in the new millennium.[2]

For their part, automation and artificial intelligence (AI) may be employed in various ways in the media sector: alongside predicting demand they may be used in content production on semi-automated to more autonomous basis, essentially referring to draft material being created for modification by human journalists or content being produced straight to publication.[3] Indeed, news related to elections, sports, and finance, among others are already created in an automated

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2 Coddington, M. (2015) Clarifying journalism's quantitative turn: A typology for evaluating data journalism, computational journalism, and computer-assisted reporting. Digital Journalism 3 (3), 331-348.

3 Napoli, P. (2014) On Automation in Media Industries: Integrating Algorithmic Media Production into Media Industries Scholarship. Media Industries 1(1), DOI: http://dx.doi.org/10.3998/mij.15031809.0001.107; see also Koponen, J. (2018) A new hope: AI for news media. techcrunch, https://techcrunch.com/2018/07/12/a-new-hope-ai-for-news-media/ (accessed 15 March 2018).

fashion both in Finland and abroad.[4] However, there are several challenges related to news automation.

In terms of principles, transparency and accountability have been recognized as important guidelines in the media sector, while news automation further increases their importance.[5] Indeed, automation and AI tend to be accompanied rather by opacity – taking into account what we know about black boxes and biases in the context of AI.[6] Moreover, automation implies both qualitative and quantitative changes in content production, leading to agency and authorship being further fragmented as news automation involves AI, machine learning, programmers, journalists, and others.[7] However, I assume that human journalists will not be replaced by newsbots, but rather coexist and complement each other in the future.

My research adopts a communications law perspective to news automation, with a specific focus on copyright law. Transparency must

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4 See eg Jackson, J. (2016) Press Association to look at automating sport and news stories, theguardian (18 Oct. 2016), https://www.theguardian.com/media/2016/oct/18/press-association-to-look-at-automating-sport-and-news-stories (accessed 15 March 2018); Lever, R. (2019) Robo-journalism gains traction in shifting media landscape. phys.org (10 March, 2019), https://phys.org/news/2019-03-robo-journalism-gains-traction-shifting-media.html (accessed 15 March 2018); Hallamaa, T. (2016) Voitto-robotti takoi NHL-uutisia – seuraavaksi kuntavaalien tulokset? yle.fi (28.12.2016), https://yle.fi/uutiset/3-9375528 (accessed 15 March 2018).

5 Picard, R. & Pickard, V. (2017) Essential Principles for Contemporary Media and Communications Policymaking. Reuters Institute for the Study of Journalism, 10, 28-31, https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2017-11/Essential%20Principles%20for%20Contemporary%20Media%20and%20Communications%20Policymaking.pdf (accessed 15 March 2019); Diakopoulos, N. & Koliska, M. (2016) Algorithmic Transparency in the News Media. *Digital Journalism* 5:7, 809-828, DOI: 10.1080/21670811.2016.1208053.

6 Coddington 2015, 337.

7 Grimmelmann, J. (2016) Copyright for Literate Robots. *Iowa Law Review* 101, 657-681.

be addressed when AI and algorithms are employed in the media sector. Research questions tackle issues, such as:

- Would the public like to know that a piece of news or part of it was machine-made? Why (not)? Does it make a difference?
- Would the public like to know about the background data and the logic or function of the automated news production? Does it make a difference if it is a question of sports news, financial news or politics? Why (not)?

In legal terms, these issues may be addressed in terms of guaranteeing access to information and explanation about the algorithms.

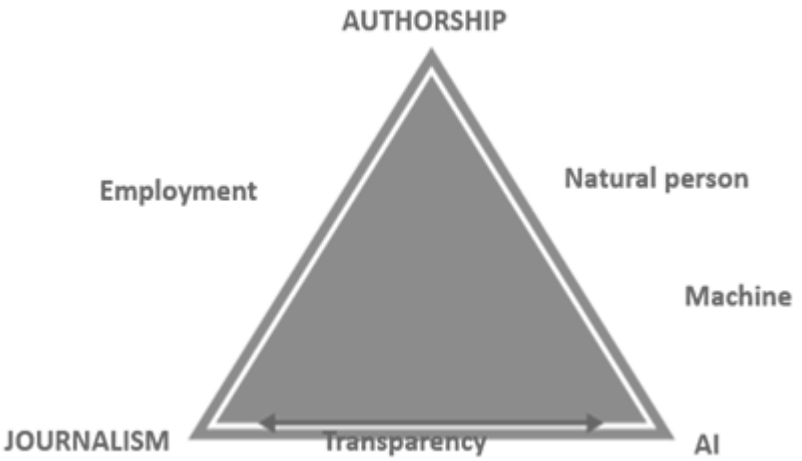

FIGURE 1: Copyright dimensions of news automation from a communications law perspective.

Since my Science Pitch I (together with my colleagues) have already examined the challenges posed by automation to the basic premise of

copyright, notably (individual) human beings as authors. Indeed, in the future, we might be facing a situation where human input is insufficient in order to meet the originality requirement as a prerequisite for copyright protection.[8]

Automation in content production brings also the question of incentives to the fore: is it even necessary to promote creativity in automated news production by means of copyright or should other forms of protection be employed to safeguard investments therein?[9] Furthermore, with regard to fragmented agency, copyright must be studied in an employment context, taking into account the peculiarities of the media sector, as well as in other type of contractual relations.

8 Alén-Savikko, A.; Ballardini, R. & Pihlajarinne, T. (2018) Tekoälyn tuotokset ja omaperäisyysvaatimus – kohti koneorientoitunutta tekijänoikeutta? *Lakimies* 7-8/2018, 975-995.

9 Alén-Savikko, Ballardini & Pihlajarinne 2018; see also Pitkänen, O. (2017) Mitä lähioikeus suojaa? *Lakimies* 5, 580-602, 601.

ATTE KUISMIN[1]

Black Box AI – The Problem with Sufficient Disclosure

1 INTRODUCTION

1.1 THE SIGNIFICANCE OF AI AND PATENTING IT

AI and related terms like machine learning and artificial neural networks have become new buzzwords[2], even in the legal world[3]. One reason for this is that while AI has been around for a long time[4] the recent developments in computing power, AI research and the emergence of Big Data have led to more practical applications for AI.[5] A second reason is the publicity that these applications have gained, from IBM's Deep Blue beating world champion Garry Kasparov in chess in 1997[6]

1 LL.M. student at the University of Helsinki Atte Kuismin, who also took part in the student panel during the Legal Tech Con 2018.
2 E.g. Mona Lebied,'10 IT & Technology Buzzwords You Won't Be Able To Avoid In 2018' (*The Datapine Blog,* 27.11.2017) <https://www.datapine.com/blog/technology-buzzwords/> accessed 4.3.2018.
3 E.g. Rob Saccone, 'The legal industry's AI landscape' (*Medium,* 8.4.2017) https://medium.com/@robsaccone/the-legal-industrys-ai-landscape-e04b307c84f8 accessed 4.3.2018.
4 The "modern" phase of AI is said to have begun in 1956, see Solomonoff p. 149.
5 MGI, pp. 8-9.
6 (*Wikipedia)* <https://en.wikipedia.org/wiki/Deep_Blue_versus_Garry_Kasparov> accessed 4.3.2018.

and Watson beating humans in Jeopardy in 2011[7] to Google's AlphaGo beating the best Go players in the world in 2016 and 2017[8].

This development has led to an increasing importance of AI to the extent that it is said to be a key part of the "Fourth Industrial Revolution"[9], although the adoption of AI technologies in companies outside the tech sector is still in its early stages[10]. The importance of AI can also be seen from the investments made by companies into researching AI; McKinsey Global Institute estimates that the tech giants, such as Google, have invested 20 – 30 billion dollars globally on AI in 2016, of which 90 % was spent on R&D and 10 % on AI acquisitions.[11] This leads to companies wanting to protect their investments applying for patents for their AI inventions more frequently as their investments rise, as can be seen from the growth rate of AI patents: 6% per year on average worldwide between 2010 – 2015[12] and 34 % compound annual growth rate for machine learning (including artificial neural networks) U.S patents between 2013 – 2017[13].

There are a few problems regarding AI patents. The problems differ depending on from whose perspective are we looking: the patentee's

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7 Jo Best, 'IBM Watson: The inside story of how the Jeopardy-winning supercomputer was born, and what it wants to do next' (*TechRepublic)* <https://www.techrepublic.com/article/ibm-watson-the-inside-story-of-how-the-jeopardy-winning-supercomputer-was-born-and-what-it-wants-to-do-next/> accessed 4.3.2018.

8 Jon Russell, 'Google's AlphaGo AI wins three-match series against the world's best Go player' (*Techcrunch,* 25.5.2017) <https://techcrunch.com/2017/05/24/alphago-beats-planets-best-human-go-player-ke-jie/> accessed 4.3.2018.

9 Klaus Schwab, 'The Fourth Industrial Revolution: what it means, how to respond' (*World Economic Forum,* 14.1.2016) <https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/> accessed 4.3.2018.

10 MGI, p. 6.

11 Ibid.

12 OECD, p. 22

13 '8 Fast Growing Technologies' (*IFI CLAIMS Patent Services*) <https://www.ificlaims.com/rankings-8-fast-growing.htm> accessed 4.3.2018.

or the society's. On the patentee's side the problems relate to whether the patentee can get the patent granted. As such the problems arising are whether the AI is even a patentable subject matter, does it pass the other general requirements for a patent and if it does, can it pass the procedural requirements. On the society's side the problems are linked to whether AI patents adhere to the basic principles of why patents exist i.e. does patenting AI inventions benefit the society by inciting competition and innovation[14].

The opposing problems of the different perspectives intersect on at least one occasion: sufficient disclosure i.e. the publicity function of a patent for which, in the context of the European Patent Convention, a person skilled in the art needs to be able to replicate the invention based on the application. From the patentee's viewpoint the problem stems from the fact that the patent application may be rejected if the invention isn't sufficiently disclosed. On the other hand, from the society's viewpoint, the problem is when a patent has been granted to an invention that doesn't satisfy the publicity function of a patent. When thinking about the "black box" nature of AI, i.e. the opaqueness of the AI makes it so that even the programmers themselves may not be able to explain why and how the AI reaches its conclusions, it raises the question of how can an opaque AI be sufficiently disclosed or how the claims can be clear, when its inventors don't exactly know how it works?[15]

14 E.g.' Frequently Asked Questions: Patents' (*WIPO)* <http://www.wipo.int/patents/en/faq_patents.html> "Why are patents useful?" accessed 4.3.2018.
15 On the "black box" nature of AI, see Will Knight, 'The Dark Secret at the Heart of AI'.

1.2 RESEARCH QUESTION AND THE STRUCTURE OF THIS PAPER

In this article my research question is to explore what is meant by sufficient disclosure in the context of AI. As the jurisdiction will be EU, I will be approaching this question mainly from the viewpoint of the relevant EPO Board of Appeals cases regarding the Articles 83, which is about sufficient disclosure, and 84, which is about clarity of claims, of the European Patent Convention (EPC). The case-based research is warranted as the subject at hand has not seemed to create much interest in the legal literature. I am excluding the issues regarding the general requirements of patenting AI and the issues with too broad or too narrow claims as there is already some legal literature on the first matter and the second matter would make this paper too broad.

I will be starting this paper with a section where I will be defining some key terms regarding AI as there are many types of AI today and not all of them are as opaque by nature as others. After that I will first be discussing what are the relevant parts of the application for assessing sufficiency of disclosure, then what is meant by "a person skilled in the art" in this context, then the clarity and completeness of disclosure and finally the requirement of reproducibility and how all of these are assessed in the context of AI.[16] In the conclusion I will bring together all the arguments I've presented.

16 This structure follows the section of sufficient disclosure in EPO's Case Law of the Boards of Appeal, 8th edition.

2 WHAT IS AI?

2.1 DEFINITION OF AI

Artificial intelligence is the ability of a computer or a robot to perform tasks commonly associated with intelligent beings according to Encyclopedia Britannica.[17] It can be further divided by functionality into weak AI, which means that the AI can only simulate human cognitive function and can only perform on specific narrow tasks and can seem to be very intelligent at them, and strong AI, which means that the AI is capable of all human cognitive functions and is able to perform on multitude of tasks just like humans.[18] AI research on the other hand can be divided into huge amount of subfields ranging from general (like learning) to specific (like playing chess).[19] The two most important fields for this paper are machine learning and its subclass deep learning and artificial neural networks(ANN), as these two are the main reason for the opaqueness of today's AI.[20]

17 B.J. Copeland, 'Artificial Intelligence' (*Encyclopedia Britannica,* 23.2.2018) <https://www.britannica.com/technology/artificial-intelligence> accessed 5.3.2018.
18 Weak AI, (*Techopedia)* <https://www.techopedia.com/definition/31621/weak-artificial-intelligence-weak-ai> accessed 5.3.2018 and Strong AI, (*Techopedia)* <https://www.techopedia.com/definition/31622/strong-artificial-intelligence-strong-ai> accessed 5.3.2018 .
19 Norvig & Russell, p. 1.
20 Will Knight, 'The Dark Secret at the Heart of AI', where the issue is handled in depth.

2.2 MACHINE LEARNING

Machine learning simply means training computer software to teach itself by sifting through huge amount of data[21], i.e. giving the AI software the ability to increase performance on a specific task without being explicitly programmed to do so. There are three main categories: supervised learning, semi-supervised learning and unsupervised learning.[22]

Supervised learning is what majority of practical applications of machine learning use and means that the algorithm makes its prediction on the labeled data that is fed to it and it is corrected if it doesn't predict correctly or in mathematical terms supervised learning means that there is an input variable (x) and an output variable (Y) and you use an algorithm to learn the mapping function from the input to the output so Y = f(x). The goal is to optimize the mapping function so well that when you have new input data you can predict the output variables of Y for that data.[23]

Unsupervised learning on the other hand means that there are input variables (x) only and no corresponding output variables, i.e. the algorithm is fed data and then left to its own device to learn about the data, so the algorithm won't be corrected by anyone. The goal is to

21 E.g. Sumit Gupta, 'What's Machine Learning? Thanks to GPU Accelerators, You're Already Soaking in It' (*NVIDIA blog*, 25.3.2014) <https://blogs.nvidia.com/blog/2014/03/25/machine-learning/> accessed 5.3.2018.

22 Jason Brownlee, 'Supervised and Unsupervised Machine Learning Algorithms' (*Machine learning mastery blog*, March 16, 2016) <https://machinelearningmastery.com/supervised-and-unsupervised-machine-learning-algorithms/> accessed 5.3.2018.

23 Ibid.

model the underlying structure or distribution in the data to find more about that set of data.[24]

Semi-supervised learning is when only a part of the input data is labeled, so only a part of the input variables (x) have a corresponding output variable (Y) with them. The goal is to either find structure on the input data or make best guess predictions on the unlabeled data and feed that data back in to a supervised learning algorithm as training data.[25]

2.3 ARTIFICIAL NEURAL NETWORKS

Artificial neural networks are algorithms, either regression (predicting values) or classification (predicting categories), that are used in machine learning.[26] They are designed to grossly simulate the networks of neurons of the biological nervous system.[27] The basic topology of a neural network is that it has at least one input layer and one output layer, but modern networks aren't that simple: in addition to input and output layers they have one or more "hidden" layers between the input and output layers.[28] Each layer contains one or more "neurons". Each neuron has a value between 0 and 1 which it calculates using the input values and the set of weights and biases assigned to that

24 Ibid.
25 Ibid.
26 Gary Ericson & William Anton Rohm, 'Machine learning algorithm cheat sheet for Microsoft Azure Machine Learning Studio' (*Microsoft Azure Machine Learning Studio Documentation,* 18.12.2017) <https://docs.microsoft.com/en-us/azure/machine-learning/studio/algorithm-cheat-sheet> accessed 6.3.2018.
27 Graupe 2007, p. 1.
28 Christopher Olah,'Neural Networks, Manifolds, and Topology' (*Colah's blog at github,* 6.4.2014*)* <http://colah.github.io/posts/2014-03-NN-Manifolds-Topology/> accessed 6.3.2018.

neuron. The output of each neuron affects the input of the next layer and whether a particular neuron in that next layer activates. The way that an ANN learns is by feeding it more input data and tweaking the weights and biases of each connection between layers, which modern ANNs have been programmed to do by themselves by using different methods such as backpropagation.[29]

2.4 DEEP LEARNING

Deep learning has many definitions, but common thing about these high-level definitions is that deep learning models consist of multiple layers of nonlinear information processing that use supervised or unsupervised learning[30], i.e. using a deep ANN, which has many hidden layers, to do machine learning. The most important attribute about deep learning for the purposes of this paper is that the deeper the system, i.e. the more layers and neurons it has, the more complicated the system becomes as there are more and more weights and biases to adjust. Therefore, it becomes more and more harder to know what happens between the input and output layers.[31]

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29 This is a gross simplification of the basic functions of an ANN using youtuber 3Blue1Brown's excellent video series 'Neural Networks' <https://www.youtube.com/playlist?list=PLZHQObOWTQDNU6R1_67000Dx_ZCJB-3pi> (accessed 6.3.2018) as a source. There are also different types of neural networks in which the basic structure is different, for example the neurons aren't connected to all neurons in the next layer, but rather only to a particular set of neurons.

30 Dong & Yu 2013, p. 201. Foundations and Trends in Signal Processing Vol. 7, Nos. 3–4 (2013) 197–387

31 Will Knight, 'The Dark Secret at the Heart of AI'.

3 THE STARTING POINT IN ASSESSING SUFFICIENT DISCLOSURE

3.1 THE GOAL OF THIS CHAPTER

In this chapter I go through the Articles 83 (sufficient disclosure) and 84 (clarity of claims) of the EPC and the relevant parts of the application in assessing them. I argue that for the purpose of this paper "sufficient disclosure" can refer to both of these Articles. After that I present the hypothetical person from whose viewpoint the sufficiency of disclosure is assessed, i.e. the person skilled in the art, and how this skilled person is defined in AI cases. The goal of this chapter is to demonstrate the starting point from which the assessment of sufficient disclosure is done in all contexts, including the topic of this article: Black box AI.

3.2 EPC ARTICLES 83 AND 84

Article 83 of EPC is titled "Disclosure of the invention" and according to it the European patent application shall disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. Article 84 on the other hand is titled "Claims" and according to it the claims shall define the matter for which protection is sought (and) they shall be clear and concise and be supported by the description. What is the relationship between these articles?

The first distinction is that compliance with Article 84 can only be examined in cases where there has been an amendment but Article 83 can be examined in any opposition proceeding, as it is one of the

128 grounds for opposition according to Article 100 (b). A second distinction can be found in the case T 0593/09 (Polyethylene terephthalate resin-coated metal plate of high processability) where the Board concludes that there is a distinction in the meaning of "clear" between Article 83, which concerns the disclosure or "technical teachings" of the application or patent and Article 84 where that term relates to claims, which "shall define the matter for which protection is sought". In short there is a difference between clarity of what is disclosed and what is claimed. [32]

In case T 0608/07 (Polymerization process) the Board found that in cases in which insufficiency arose through ambiguity, i.e. where it is possible to use both Article 83 and 84, it is not enough to show that ambiguity existed, but rather the ambiguity must be so severe that it deprives the person skilled in the art of the promise of the invention. The board concludes that the delicate balance between the Articles 83 and 84 must be assessed on the merits of each individual case. This is because it should be carefully examined that the insufficiency claim based on ambiguity isn't just a way to secretly using clarity of claims as a ground for opposition.[33]

3.3 RELEVANT PARTS OF THE APPLICATION

In assessing what parts of the application are relevant to both Article 83 and 84 there are a few leading decisions: T 0014/83 (Vinylchlorid resins) and T 0169/83 (Wall element) which concern Article 83 and T 0818/93 (Expandable intraluminal graft) which concerns both Articles. In "Vinylchlorid resins" the Board concludes that the application in

32 T 0593/09, point 4.1.3 of the Reasons.
33 T 0608/07, point 2.5.2 of the Reasons.

question was sufficiently disclosed even though the experimentation contained in the description was needed.[34] In "Wall element" the Board argues that due to fairness to applicants and public interest, it is possible to extract features from the description and drawings in the light of Article 83, although it must be kept in reasonable bounds as it increases legal uncertainty.[35] In "Expandable intraluminal graft" the Board argues that "the drawings must be considered as ranking equally with the other elements of the application to satisfy the requirements of Articles 83 and 84".[36] It follows that the whole application must be considered when assessing whether the application complies with both Article 83 and 84.

Also in T 0032/84 (Redefining an invention) the Board concludes that the invention in question was sufficiently disclosed, even though a circuit in one drawing fails to function, as it is possible for the person skilled in the art to see the needed capacitators and deduce that they can be used from another drawing.[37] This means that even though certain elements of the invention aren't explicitly disclosed, this doesn't mean that it is automatically insufficient if they can be found to be disclosed implicitly.

On the other hand, this means that substantially any embodiment of the invention, as defined in the broadest claim, must be able to be carried out by the person skilled in the art based on the disclosure.[38] This means that the disclosure is insufficient even if an irrelevant part of the claim cannot be realized based on the disclosure. What can be considered as a limitation to this rule, the Board in T 0206/13 (Surface-

34 T 0014/83, point 9 of the Reasons.
35 T 0169/83, point 4.1 of the Reasons.
36 T 0818/93, point 3 of the Reasons.
37 T 0032/84, point 6 of the Reasons.
38 Case Law of the Boards of Appeal 8th edition, II.C.2, third paragraph.

130 enhanced spectroscopy-active composite nanoparticles) concludes that technical aspects that are referred to in the claims, but are not defined, are not to be considered in the assessment under Article 83, but such technical aspects might be considered under Article 84.[39] This statement by the Board also sheds some light on the difference between Articles 83 and 84 as in only defined claims can be considered under Article 83, but undefined claims may still be considered under Article 84.

Because of there is only a small difference between the Articles in the light of this paper, as demonstrated in this and the previous subchapter, I am using sufficient disclosure as a term that encompasses both Articles in this paper.

3.4 A PERSON SKILLED IN THE ART

3.4.1 GENERAL DEFINITION OF THE SKILLED PERSON

The person skilled in the art when assessing Article 83 or Article 84 is the same as when assessing whether there is an inventive step[40], but the assessment of the skilled person differs between the Articles. In assessing Article 83, the invention must be disclosed in a manner sufficiently clear and complete for it to be carried out by the skilled person. On the other hand, in assessing Article 84 "clarity demands not only that a skilled person be able to understand the teaching of the claim but also that he be able to implement it. In other words, the feature must provide instructions which are sufficiently clear for the

39 T 0206/13, point 3.4 of the Reasons.

40 Case Law of the Boards of Appeal 8th edition, II.C.3.1, second paragraph, where Article 84 isn't mentioned, but it can be deduced that it is the same e.g. from case T 0818/93 point 3 of the reasons, where the Board discusses both articles without making a distinction between the skilled persons.

expert to reduce them to practice without undue burden, if necessary with reasonable experiments"[41]

According to the case law of the Boards of Appeals, "the person skilled in the art should be presumed to be an experienced practitioner who has average knowledge and abilities and is aware of what was common general knowledge in the relevant art concerned at a particular time (average skilled person). He should also be presumed to have had access to everything in the state of the art, in particular the documents cited in the search report, and to have had at his disposal the normal means and capacity for routine work and experimentation".[42] The skilled person is an expert in a technical field.[43] Even though the skilled person is skilled in particular technical field, they will seek suggestions from neighboring fields and also from a general technical field if they are aware of such fields.[44] The "person" skilled in the art can also be a team of professionals, especially in advanced technical fields.[45]

A skilled person may use his common general knowledge to supplement the application to the point that the skilled person may even recognize and correct errors in the description. What counts as being common general knowledge? The common general knowledge is partly comprised of textbooks and general technical literature on the subject. On the other hand, scientific articles, patent literature and information that can be obtained only after extensive searching is not part of the common general knowledge. As an exception to this, when a technical field is so new that there has been no textbooks or other sources of general knowledge on the subject, even scientific

41 T 0068/85 point 8.4.3 of the reasons.
42 Case Law of the Boards of Appeal 8th edition, I.D.8.1.1, paragraph 1.
43 Ibid.
44 Ibid., paragraph 2
45 Ibid.

publications or patent specifications can be considered as common general knowledge.[46]

Even though the skilled person may use their common general knowledge to fill in the gaps in the application, it must still provide guidance for the skilled person to enable them to identify all the essential processes of the patent application. The skilled person should not have to work these out by himself.[47]

The biggest step in "making" the hypothetical skilled person seems to be the deduction of what the technical field of the skilled person is, as this is the field from which the assessment of sufficient disclosure is made. All the skills that the skilled person has is tied to the technical field, as is their common general knowledge, what can be counted as being in their common general knowledge and influences what the neighboring technical fields can be. Therefore, the next subchapter is dedicated to looking at how the technical field has been defined in AI cases.

3.4.2 WHAT IS THE TECHNICAL FIELD OF THE SKILLED PERSON IN AI PATENTS?

Determining the technical field of the skilled person is crucial when assessing sufficient disclosure, as the sufficiency is determined from the viewpoint of the skilled person. How do the general rules regarding the skilled person work in the context of AI?

First it must be noted that there are at least two basic types of AI patents: patenting the AI itself or patenting the use of AI in a different

46 Case Law of the Boards of Appeal 8th edition, II.C.3.1, paragraphs 3 and 6.
47 Ibid., paragraph 5.

field.[48] How does the technical field of the skilled person differ between these two types? It must be kept in mind that as AI is software, the general rules regarding software patents applies.[49] This is important as the field must be technical and software as such is not technical in the light of EPC Article 52(2)(a), so the field is the one in which the software solves a technical problem.

I have chosen the next six cases on the basis that they create an overview on how the technical field in AI cases is deduced and how different they can be. They also showcase the difference between patenting AI itself and patenting the use of AI in a different field, although only the first case is about the former. I handle the cases in some detail first, as these details are important for the conclusions I present based on these cases.

Case T 0521/95 (Pattern recognition/RDC JAPAN) is about a pattern recognition software, that is based on an Artificial neural network (ANN). The case is about sufficient disclosure. The Board handles the technical properties of an ANN in relation to sufficient disclosure in some depth, but relevant for this section is what is the technical field in this case. The field can be found in the appellant's arguments[50] and in the reasons section 4.11: the field of pattern recognition. Because the field is a subfield or in some cases almost synonymous with machine learning, and the case is about patenting AI itself, the "choice" of the technical field here seems natural.

48 Patenting the AI itself could be divided into two subcategories: patenting AI "as is" i.e. patenting the code and mathematics behind the AI and patenting AI while showing it solves a technical problem. As patenting AI "as is" makes it unpatentable, it does not have much relevance for the purpose of this article.

49 See EPO 2018, p. 2 for example.

50 Summary of Facts and Submissions, section V, paragraph 5.

134 Case T 1153/02 (Diagnostic system/FIRST OPINION) on the other hand is about "computerized medical diagnostic system utilizing list-based processing" and the case is about the inventive step. The invention's inputs consist of answers to basic questions posed to the patient, which it then uses to allocate weights to different diseases and after reaching a specified weight on a disease, outputs that disease as the diagnosis. As the invention is heavily tied to the medical field, it is no surprise that the field of the skilled person in this case is medical informatics.[51]

Case T 0598/07 (Cardionetics Limited) is about a "heart monitoring apparatus and method", which uses a type of ANN using unsupervised learning called a "Kohonen network". The Kohonen network is used to monitor whether there is an irregularity in the heartbeat of the user of the invention. The case is about novelty, inventive step and clarity of claims. Even though the Kohonen network is an essential part of the case, the field of the skilled person in this case is simply electrocardiograph monitoring.[52]

Case T 0466/09 (Nokia) is about "a method for monitoring the health of a patient by measuring and predicting the glucose level of the patient's blood sample" and it concerns the sufficiency of disclosure and the inventive step. The invention uses an adaptive mathematical model called Widrow-Hoffs (only Widrow in the case) Least Mean Squares (LMS). This model makes predictions of the user's glucose levels and after getting the correct reading, corrects the prediction coefficients. In other words, the invention uses a self-learning algorithm that can be called AI. The field of the skilled person in this case is not specified in any way by the Board, but it can be deduced from the literature

51 Reasons 3.2, paragraph 2.
52 Reasons 4.3.1, paragraph 4.

forming the common general knowledge of the skilled person. The field is something relating to using AI in insulin monitoring, so the field could be for example, using case Diagnostic system/FIRST OPINION above as an example, medical informatics, but the emphasis being on the programming side of things and especially programming related to AI, as the case revolves around the AI part of the invention.

Case T 1662/09 (Eye control of computer apparatus/TOBII) is about "eye control of computer apparatus" and the legal question is technically about remittal to the department of first instance, but substantially about the inventive step. The invention in question uses an "event engine", i.e. uses event-based programming to achieve the goal of the invention, while the closest prior art uses an ANN. The field of the skilled person in this case can be found from the Summary, part V, document 6(D6), which is a textbook that comprises of the common general knowledge of the skilled person in the field of object-oriented graphical user interfaces. So, in this case the field is not actually related to the AI component of the invention, i.e. the eye tracking.

Finally, case T 1285/10 (Genetic analysis computing system/IRIS BIOTECHNOLOGIES), is about an artificial intelligence system for genetic analysis and Articles 56, 83 and 84. The skilled person in this case isn't explicitly mentioned, but there is a list of texts that exemplify the common general knowledge of the skilled person. As all the texts are about gene expression patterns and functional genomics, it seems that the skilled person is an expert on the biological side of things rather than programming.

From these cases it can be seen that there is no "one size fits all" type of skilled person in regard to AI, but the skilled person is deduced case by case, as it should be. However, in all the cases regarding the use of AI in another technical field, the skilled person is always an expert in the

area that the AI is applied in, but not always in the programming side of things as based on the cases it seems that this side of the invention is often downplayed. This might be because the Board has not found or the appellant has not raised a problem regarding the AI part of the invention, so the cases have focused on the field of application of the invention.

I find the downplaying of the AI part of the invention regarding the technical field of the skilled person problematic. From the patentee's side the problem might be that if the technical field of the skilled person is not heavily tied to the AI part of the invention, the patentees might find themselves in a situation where they have disclosed the application in such a way that they have omitted some parts of the invention that would be obvious to the expert in the field of the particular AI programming, but not so much to the skilled person in the field where the AI is applied. This could lead to claims of insufficient disclosure and therefore could get the patent application denied. However, in the cases above, this problem doesn't seem prevalent. But as the cases are quite old, as the new wave of patent applications for AI started a few years back, the Board hasn't handled cases of the new wave yet, so this might be a problem in the future.

The problem in these cases is more tied to not handling the AI part of things in depth, because they have focused on the field of application, as the skilled person technical field has been defined there most often. In cases Cardionetics Limited, Eye control of computer apparatus/TOBII and Genetic analysis computing system/IRIS BIOTECHNOLOGIES it can be seen that the field of the skilled person leads to a situation where the AI part of things isn't actually handled in depth. This might lead to a problem from the society's point of view, as this way the patent may be granted, even though the AI part of the invention might actually be

insufficiently disclosed, because it hasn't been handled in depth due to the skilled person's technical field. This problem is mitigated by the fact that in these cases the patent grants protection only in the field of application, so the patent doesn't include the specific programming techniques used in AI programming. On the other hand, this might also lead to a patent that actually includes a very broad claim of using any AI in that particular field, which would be very problematic as this would prohibit competitors from using different types of AI that could compete with the granted patent.

As the analyzing of sufficient disclosure is done from the viewpoint of the skilled person, it is essential that the defining of the skilled person is done carefully as the technical field of the skilled person defines what is actually considered to be sufficient. This should be kept in mind when looking at the requirements of sufficient disclosure, which I will be looking at the next chapters.

4 SUFFICIENCY OF DISCLOSURE

4.1 THE REQUIREMENTS FOR SUFFICIENT DISCLOSURE

Sufficient disclosure is made of two requirements: clarity and completeness and reproducibility. In this chapter I go through these requirements by first presenting what they mean in general and then look at how they apply in AI cases.

4.2 CLARITY AND COMPLETENESS OF DISCLOSURE

4.2.1 WHAT DOES CLARITY AND COMPLETENESS INCLUDE?

The requirement of clarity and completeness in Article 83 means that the disclosure of the invention must be such as to enable the skilled person to reproduce the claimed step without any inventive step on the skilled person's part.[53] The skilled person must be able to do this based on the application and their common general knowledge.

In case T 1164/11 (Medical apparatus for cutaneous administration of mendicaments) the effect of the claimed invention was known, but there was a lack of scientific explanation. This raised the question whether the invention can be sufficiently disclosed if only the effect of the invention is known, but the reason for the effect is unknown. The claimed effect in question was using a laser light to push molecules of a medicament into the skin. The board accepted that an invention might be sufficiently disclosed even though the exact scientific explanation isn't known, if the unexpected effect is convincingly demonstrated, although the Board found that the application in question was insufficiently disclosed.[54]

According to established case law of the Board, the invention is in principle sufficiently disclosed if there is at least one way clearly indicated that enables the skilled person to carry out the invention. If the one way is clearly indicated, it is immaterial whether some variants of functionally defined component features of the invention are unavailable, if it is possible to find these variants from different

53 Case Law of the Boards of Appeal 8th edition, II.C.4.1., first paragraph.
54 Ibid., second paragraph.

parts of the disclosure or from the common general knowledge of the skilled person.[55]

In contrast to the "one way" which is mandatory, the use of examples generally is not. The possible examples in the disclosure must be considered in the same light as other parts of the disclosure. This means that examples might be mandatory only when they are essential for the disclosure to be sufficient.[56]

The "one way" must be such that it allows the invention to be performed in the whole range claimed, i.e. if there is only a one way disclosed, it must be enough to let the skilled person to perform all claimed parts of the invention. This also means that all claimed embodiments of the invention must be sufficiently disclosed. This principle applies regardless of the way the invention has been claimed, be it by function or by process.[57]

If the invention in question is characterized by a distinct set of unfamiliar parameters, the patentee is under a particular obligation to disclose all the information needed to define these parameters in such a way that the skilled person can find these parameters without undue burden. The method for finding these parameters must produce such consistent results which are relevant for solving the technical problem underlying the patent application.[58]

4.2.2 CLARITY AND COMPLETENESS IN THE CONTEXT OF AI PATENTS

55 Ibid., II.C.4.2., first paragraph.
56 Ibid., II.C.4.3.
57 Ibid., II.C.4.4.
58 Ibid., II.C.4.5.

How to apply the conditions above to AI patents? First, I'll look at specific cases regarding AI and sufficient disclosure and after that I'll be looking at problem more generally, from the technical perspective of AI.

In the case T 0521/95 (Pattern recognition/RDC JAPAN) the disclosure begins with an explanation of how the human brain works, as the invention is said to be based on that and after that it discloses the structure of the ANN and the processes behind it. The Board finds many problems with clarity and completeness in this case: the problem of defining the "one way", the problem with weighting coefficients as parameters and the lack of adequate instructions and vague functional nature of description, which do not enable the skilled person to perform the invention.

First the Board finds it difficult to find out what the invention actually is and particularly a one way of performing it. According to the Board it is not clear based on the application what pattern recognition problem any of the different variants of the ANN presented solve. The Board concludes that the variant shown on Figure 26 is the most likely candidate to be sufficiently disclosed, so that variant is the one to be analyzed. [59]

Secondly the Board concludes that it is possible for the skilled person to perform the actual ANN based on the description, but the pattern recognition that this system should be able to do is the problem. There is also a disagreement between the Board and the applicant whether the structure of the ANN constitutes the "software"

59 T 0521/95, points 4.1-4.2 of the Reasons.

part or the "hardware" part of the invention, as the Board sees this as the "hardware" part of the invention contrary to the applicant.[60]

This disagreement leads to the problem of the weighting coefficients used in the ANN to recognize certain patterns, as the disclosure doesn't actually tell these. It must be determined whether the weighting coefficients can be determined by the common general knowledge of the skilled person. According to the Board the common general knowledge only gives some general rules for this and doesn't help the skilled person to train the system in this case.[61]

Next the Board says that the description doesn't give a single "worked" example of the invention and rather the appellant has stated that the invention hasn't been carried out and the project has been discontinued.[62]

The Board concludes that the invention hasn't been sufficiently disclosed, as it is not possible for the skilled person to carry out the invention based on the application and their common general knowledge.

As the case T 0598/07 (Cardionetics Limited) is mostly about the inventive step, the clarity part of the case is quite brief and the problem in this case was whether the diagnosis step was an essential part of the invention, rather than the ambiguity of the claims. From reading the amended claims and description of the application, it is quite clear why there were no such problems, as in the previous case, with the disclosure of the Kohonen ANN. In the amended description the use of Kohonen ANN is handled in some depth and more importantly the data needed to train the network is given.[63] Together with the amended

60 Ibid., points 4.3-4.4 of the Reasons.
61 Ibid., points 4.6-4.8 of the Reasons.
62 Ibid., points 4.5 and 4.10 of the Reasons.
63 T 0598/07, pages 2-7 of the amended description of the application.

142 claim 28, the disclosure is quite detailed compared to the previous case, although the cases are not entirely comparable as the Kohonen network is an example of a deep learning network, which means that the parameters used are even more essential than in a "regular" ANN, using supervised learning, for sufficient disclosure.

In case T 1285/10 (Genetic analysis computing system/IRIS BIOTECHNOLOGIES) the examining division objected to the use of the term (among others) "Artificial intelligence routines" as lacking clarity. The Board however argues that this is not the case, as the term has a "well known meaning per se" and the description gives two examples of such systems: a rule-based system and a neural network.[64] The examples can be found on the pages 10-12 of the description. There the applicant gives an example of a general rule-based system and mentions that a neural network can be used instead.[65] The applicant does not disclose how to apply these systems to the invention, as the rest of the disclosure refers only to "artificial intelligence systems" without specifying which one is used and how. In the pattern recognition case above, the disclosure was deemed insufficient because it was too abstract and didn't include working examples of the ANN. This case seems quite similar to that one in that regard, but the Board seems to have reached a contrary decision.

What can be concluded from these cases is that the "parameters" such as the weighting coefficients and input data to be used matters quite a lot in the case of AI as these are a key part of disclosing the "one way" of the invention, although in Genetic analysis computing system/ IRIS BIOTECHNOLOGIES not giving out the parameters didn't seem to be a problem.

64 T 1285/10, point 3 paragraph 6 of the Reasons.
65 Ibid., point 0071 of the description of the application.

From the technical point of view, the technical properties of an ANN make it so that the "one way" cannot be disclosed without disclosing the data used as input data for the training of the network as different input data leads to different weighting coefficients and thus leads to different results. It is also important to disclose the structure of the ANN as it leads to different results, especially the type of ANN or even AI in general used. From the technical point of view, it seems bizarre that it could be sufficient to refer to neural networks in general, as was in "Genetic analysis computing system/IRIS BIOTECHNOLOGIES", as it is impossible to deduce what to code from that.

Regarding the "black box" nature of AI, the problem under clarity and completeness seems to boil down to the question of how to disclose the "one way". If the programmers disclose the input data, the structure and the different algorithms or code behind the ANN would it constitute a "one way", even though they don't know what happens to the weighting coefficients and how it reaches its conclusion? It could be argued based on the case where there was a lack of scientific explanation that it would be enough in the case of AI, if the claimed effect is convincingly demonstrated in the application, even though the inner workings of the ANN aren't completely known.

Another problem is linked with the data used, as today in the world of big data the amount of data used to train the ANN is so huge that it can be hard to know what the essential part of the data is. The problem in this regard boils down to whether the "parameter" of data can be disclosed in such a way that the skilled person can use it without undue burden and on the other hand can the data be consistent, as the data sets used evolve as the data subjects change. Also, is it enough to disclose a huge amount of data without knowing the parts of the data that was essential for the training of the algorithm? Does the same

data set consistently produce the same results? These questions are better left for the future case law.

4.3 REPRODUCIBILITY

4.3.1 REQUIREMENTS FOR REPRODUCIBILITY

The requirement for reproducibility differs from the "one way" approach described above in that the "one way" is about the process of reproducing the invention while reproducibility is about the effect of the invention.[66]

The first significant requirement for reproducibility is repeatability. According to established case law repeatability does not mean that a specifically described example of a process must be exactly repeatable, as long as the process reliably leads to the desired outcome.[67]

The second requirement is that the disclosure must be reproducible without undue burden. First, this means that even though a reasonable amount of trial and error is permissible, the skilled person must have enough information to lead them towards successfully reproducing the disclosure after possible initial failures. Second, this means in the context of parameters, that if the skilled person can only find the correct parameters from numerous alternatives by trial and error, this is regarded as being an undue burden.[68] If the selection of parameters is a matter of routine for the skilled person and/or there is more information on the parameters in examples provided in the description, the disclosure is deemed reproducible.[69] In contrast to trial and error,

66 Case Law of the Boards of Appeal 8th edition, II.C.5.1, second paragraph.
67 Ibid., first paragraph.
68 Ibid., II.C.5.6.1.
69 Ibid., II.C.5.6.3.

if the disclosure requires experimentation this constitutes as an undue burden, unless they must be carried out only to find the numerical limits of a defined range.[70]

If the claimed process occasionally leads to failure, this does not mean that it is not reproducible, if it only takes a few tries to successfully perform the invention, as long as these tries do not mean an inventive step for the skilled person.[71] On the other hand if the disclosure requires some non-disclosed steps these must be so apparent to the skilled person, that it would unnecessary to disclose them in the light of the common general knowledge of the skilled person.[72]

4.3.2 REPRODUCIBILITY OF A "BLACK BOX" DISCLOSURE

What are the problems with reproducing an AI with a "black box" design? How do the general rules laid out above apply? Here I go through the requirements of reproducibility laid out above in the context of a "black box" AI by looking at how AI case law has handled them and how the technical properties of "black box" AI affect the assessment.

First the requirement of repeatability does not require that the process must be exactly repeatable, as long as the desired outcome is reached. In the context of a "black box" AI this would mean that it does not matter if the skilled reader does not know the exact inner workings of the AI, if they can reach the desired outcome based on the disclosure and their common general knowledge.

70 Ibid., II.C.5.6.7.
71 Ibid., II.C.5.6.2.
72 Ibid., II.C.5.6.6.

146 The requirement that the disclosure must be reproducible without undue burden seems more problematic.[73] With a "black box" AI, for example a deep learning networks, the weighting coefficients, the data used to train the algorithm and the data used as the input are essential for the AI to work correctly.[74] But the problem is that the programmers don't actually know the exact weighting coefficients in these types of AI and it is difficult to disclose all the massive amounts of data used. Therefore, how can the skilled person know the parameters without unreasonable amount of trial and error or even experimentation? It could be argued in some cases that the selection of parameters is a matter of routine for the skilled person, especially in the case of the data used.[75] It could also be argued that in some cases the data to be used could be so obvious that it would be unnecessary to disclose it. This doesn't remove the problem with the weighting coefficients as they are a key part in the inner workings of a deep learning network, but as in the case T 0598/07 (Cardionetics Limited) there is not always a need to disclose these for the invention to be sufficiently disclosed, as in that case the applicant sufficiently disclosed the Kohonen network without going deep into the inner workings of it, but rather by focusing on how it principally works and the data used.

As most of the AI today is not 100% accurate it raises the question of applying the occasional failure doctrine. As there are a lot of different types of AI between which their accuracy differs widely the occasional failure doctrine could apply in some cases. As there is no case law on this matter, the question of how big of an error rate can AI have before the occasional failure doctrine applies, remains for the future case law.

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73 This was one of the problems in T 0521/95 (Pattern recognition/RDC JAPAN), see point 4.9 of the Reasons.

74 See Ibid., points 4.4 – 4.8 of the Reasons for example.

75 As the appellant argued in Ibid., point V of the Summary of Facts and Submissions.

5 CONCLUSION

Throughout this article I have been presenting how the general rules regarding sufficient disclosure are applied in the context of AI, especially the “black box” type of AI, as the research question was to explore what is meant by sufficient disclosure in the context of AI. I approached this by going through EPO Board of Appeals case law regarding sufficient disclosure in general and AI and on the other hand by applying the general rules found in the case law to the technical properties of AI, especially ANNs. Based on this research there seems to be a few problems with sufficient disclosure and AI. First the problem of defining the technical field of the skilled person, where the defining of the technical field seems to lead to downplaying the AI parts of the inventions. Second the problem with disclosing at least one way of performing the invention which seems problematic with “black box” AI, where the inner working of the AI might be unknown. Third the problem with trying to make the disclosure reproducible without undue burden, especially when it comes to trial and error in finding the parameters in an “black box” AI.

All of the cases that I have presented here are from before the new wave of patenting AI, as the cases arising from the new wave have not found themselves in the hands of the Board of Appeals yet. The problems I found will be even more prevalent in future cases as the AI software will be much more complex and opaque than those that were present in the cases presented in this paper. Therefore, in my opinion the problems that I have presented should be considered extra carefully when handling the new wave of applications and the inevitable appeals of the applications. There should be an emphasis on balancing the needs of the applicant and the needs of the society

when dealing with AI patents, as AI will have a huge impact for the society in the future. The problem is that on the other hand the process should be fair for the applicants. The problem with defining the technical field of the skilled person might make the process unfair for them. On the other hand, if the applications are not scrutinized closely enough, patents might be granted for inventions that have not disclosed the essential parameters needed for the skilled person to perform the invention in question. It is essential therefore that the AI part of inventions are not downplayed and are handled in depth.

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IV

Towards New Horizons of Law Research

RIIKKA KOULU & TIMO HONKELA[1]

Modelling Justice by Emergence? Rights and Values in AI Development

1 THE LEGAL SYSTEM IN THE TIME OF ARTIFICIAL INTELLIGENCE

1.1 "AN AI SCHOLAR AND A LEGAL SCHOLAR WALK INTO A BAR..."

Borrowing the popular Internet catchphrase, interdisciplinary research is like teenage sex: everyone is talking about it, no one knows how to do it, everyone thinks everyone else is doing it and so claim to be doing it. The same has been said about big data, AI, and machine learning, to name but a few. Although this comic relief is often used to expose buzz words, perhaps there is a seed of truth here and the key to success actually does start with talking, hopefully followed by mutual understanding? These were some early musings on the necessity and the difficulties of interdisciplinary research we shared over a pint of beer in the aftermath of the inaugural professor meetup of Helsinki

1 Riikka Koulu, assistant professor on Law and Digitalisation, Faculty of Law, University of Helsinki; Timo Honkela, research director on Digital Humanities, Faculty of Arts, University of Helsinki. We would like to thank University of Helsinki Legal Tech Lab's research assistant LLB Kalle Markkanen for his assistance in finalising this paper.

Centre for Digital Humanities (HELDIG) in late 2017, which later on led to this dialogue taking place at the Legal Tech Lab's 2018 conference on AI.

Our objective here is twofold. On one hand, we want to draw attention to the need for interdisciplinary research on AI ethics, as we consider this to be vital for sustainable AI development. On the other hand, we want to exemplify how such interdisciplinary work could be initiated, first, by mapping out similarities and differences in how our respective fields (according to our subjective interpretations) conceptualise algorithmic fairness and, second, by reflecting how knowledge exchange can contribute to a more comprehensive approach to the societal consequences of algorithmic models.

From which backgrounds do we approach this issue, which disciplines and perspectives are we bringing to this topic? One of us, Research Director Timo Honkela from the University of Helsinki has played a seminal role in Finnish AI research on social-cognitive systems. He started his research on natural language processing with rule-based systems in the 1980s and changed his methodological point of view into statistical machine learning and neural networks in early 1990s. In particular, Honkela was expanding professor emeritus Teuvo Kohonen's work on self-organising maps into humanities and social sciences.[2] Timo has also written a book on the potential of using AI as a "peace machine", with the objective to advance the welfare of humanity as a whole. In his book he describes how artificial intelligence methods could, for example, facilitate mutual understanding regardless of cultural differences, improve our ability to recognise emotional states in ourselves and in others, and event support societal

2 Teuvo Kohonen, Self-Organizing Maps. Springer Series in Information Sciences 1995.

processes related to democracy and economics.[3] In turn, Riikka Koulu is an assistant professor on Law and Digitalisation at the University of Helsinki and director of the University of Helsinki Legal Tech Lab. Riikka did her doctoral dissertation in procedural law on privatisation of coercion in digital environments and her postdoctoral research projects deal with legal framework for algorithmic decision making in public administration, conflict management in digital environments and technological change of legal institutions and professions.

How to reconcile such differing research backgrounds and research interests, which are often formulated from the perspective of one's discipline? Do we start with methods and theoretical frameworks, concepts or themes, objectives or expected results, should we focus on the process of scientific debate or the production of research findings? Here, we decided to experiment rather than to explicate, following a loose methodological approach of free association and discussion, without any particular starting points or expectations, trusting that we would find connection points and common ground and that by doing so, we would stumble upon interesting ideas that could later on be elaborated into concrete research interests and knowledge constructing needs. This being said, we both also acknowledge the value of strategic naivety; the need to develop feasible utopias and not only convincing dystopias and the role that curiosity and ability for self-reflection play in this.

Like so many current debates about interactions between law, technology, and society, our conversation started gravitating towards the societal consequences of algorithmic models, a topical theme

3 Timo Honkela, Rauhankone: tekoälytutkijan testamentti. Gaudeamus 2017. The French edition by Éditions Saint-Simon forthcoming in 2019, The Estonian edition "Rahumasin: Tehisintelleksi uurija testament" by Koolibri forthcoming in 2019.

currently associated most often with discrimination and bias the use of algorithms reinforces and reinterprets in the society. Such examples can be drawn from a variety of applications both within the public and the private sphere, ranging from credit scoring and recruitment processes to criminal justice and social security.[4] However, it should be noted that societal consequences of AI development are not necessarily as straightforward as the dystopian examples would lead us to believe. Although automation bias is a reality, there are also intersecting, overlapping and diverging consequences involved in algorithmic modelling of reality. In the end, the negative consequences can - and at times, should - be juxtaposed with the overall promise of automation as they are discussed both in research as well as in public debate: automation in theory means that less human resources are needed, although as has been noted the resources freed by technological development have never been distributed fairly. Thus the question is, how do we provide for legitimacy, security and fairness when on a global level the benefits of digital technologies benefit only a small privileged minority?

In both data science and legal scholarship, the concern for negative consequences of algorithms is often associated with the demand for algorithmic fairness, or fairness-aware AI. But what exactly is meant by fairness, or by algorithms for that matter? The aspiration to marry AI with fairness is by default an interdisciplinary exercise, as algorithmic fairness intersects with data science, ethics, governance and protection of fundamental rights. In the end, a legal scholar

4 See e.g., Danielle Keats Citron – Frank Pasquale, The scored society: Due process for automated predictions. 89(1) Wash. L. Rev. 2014, p. 1-33; Julia Angwin – Jeff Larson – Surya Mattu –Lauren Kirchner, Machine bias. Propublica 23.5.2016. Available at <https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing> accessed 20.6.2019.

would say, regulatory and normative frameworks provide the concrete means for implementing restrictions and safeguards necessary for sustainable use of algorithms. The AI scholar would concur by stating that it is an issue beyond the ability of computer and data science to create the boundary constraints for the development of algorithmic decision making models. Simultaneously, the fields can provide new perspectives for each other. For example, algorithmic decision making can provide us with new tools for making legal safeguards more effective, for example, by implementing them within the technological architecture, as is suggested by justice by design approaches.[5] Also, AI methods could provide a window for examining justice in new ways, as an emergent phenomenon that arises from collective human action.

At the same time, there is an urgent need to develop normative frameworks for future AI development and to ensure the protection of fundamental rights, which has led to both to the development of soft law instruments such as ethical charters as well as growing pressure towards European regulatory action.[6] Simply put, the rules of the game need to be decided and legislation is one way to go about it. However, the legislative quality requirement of technological neutrality further complicates formulation of regulation. In any case, regulating artificial

5 Burkhard Schafer, Opening the black box: Petri nets and privacy by design. 31(1) International Review of Law, Computers and Technology, p. 68–90.

6 For example, The European Commision set up an independent research project into AI ethics. See, European Commission, Ethics Guidelines for Trustworthy AI, High-Level Expert Group on Artificial Intelligence. 2019. Available at <https://ec.europa.eu/futurium/en/ai-alliance-consultation> accessed 20.6.2019. See also the Montreal declaration for a responsible development of artificial intelligence, available at <https://www.montrealdeclaration-responsibleai.com/the-declaration> accessed 20.6.2019; see also The Toronto Declaration: Protecting the right to equality and non-discrimination in machine learning systems, available at <https://www.accessnow.org/cms/assets/uploads/2018/08/The-Toronto-Declaration_ENG_08-2018.pdf> accessed 20.6.2019.

intelligence requires a holistic approach and dialogue between disciplines varying from social scientists to natural scientists regardless of the difficulties caused by different ontological and epistemological stances. The place to start, in our opinion, is the dialogue between individuals.

This paper is divided into four parts in addition to this introduction, following the structure used in dialogue at the conference. In the next section, we provide an overview on the development of artificial intelligence and different paradigms of the research, as these differences also carry significance from philosophical as well as from a practical point of view. We also provide a brief description of legal debates and research themes AI has given rise to during the last years and demonstrate, how the legal system produces anthropocentric law. Following this in section 3, we discuss the ontological and epistemological differences between social and natural sciences in mapping out complex social reality. We examine how the shift from rule-based systems to machine learning techniques, at least partly, enables us to overcome these differences and pinpoint how one problem related to algorithmic fairness can be found in our tendency to ascribe objectivity to technology. In section 4, we discuss how fairness-aware AI could be construed as interaction between human and algorithmic actors. Finally, in section 5 we offer some concluding remarks on the lessons we learned from our discussion as well as on the first steps towards interdisciplinary research.

2 FIRST ROUND: UNDERSTANDING AI AND UNDERSTANDING LAW

2.1 FROM RULE-BASED AI TO LAYERED NEURAL NETWORKS: NATURAL LANGUAGE AND SOCIAL COMPLEXITY

It should be noted that defining AI has traditionally been an issue of moving goal posts, where often functionalities not yet in existence were ascribed the definition only to be called something else once their technical implementation had become feasible. Thus, it is important to place AI development to relevant societal context and to elaborate what is currently meant by artificial intelligence.

In the 1980s and before, active development of AI was based on rule-based systems. In various domains, experts were interviewed in order to elicit theory knowledge and code it in the form of rule sets to facilitate decision making and problem solving in computing. Despite large investments, development of medical or legal expert systems or natural language processing system did not reach breakthrough results. The reason for the relatively modest success can be coined to two reasons. The number of rules needed to model the expertise approved to be very large. Furthermore, concerns started to grow that human knowledge and expertise cannot be fully modeled using symbolic rules.

As said, there is ambiguity surrounding the concept of artificial intelligence, which still in the AI summer of 1980s was largely synonymous with rule-based models but nowadays refers mostly to the use of statistical machine learning and neural networks for tasks such as classification and pattern recognition. The difference between

these techniques is also relevant for legal AI applications, as the unrealistic expectations towards AI and the shortcomings of rule-based systems lead to the field's stagnation in 1980s. At the time, rule-based systems within law often took the form of Expert Systems, creation of which required professionals of a given legal field to formulate the rules that the system would then follow through in its operations. The formulation of rules, however, proved out to be a laboursome task of only limited practical applications, as the legal system's complexity could not be simplified into rules without something getting lost. Early developments led to the old consensus still often repeated by both scholars and practitioners alike - that computational methods in law are mostly suitable for automating routine-like simple cases, which require no discretion and can hence be presented as rule-based systems with 'if/then' commands.[7]

Thus, an important distinction needs to be made between reasoning and representation of knowledge, which relates to the relationship between complex social reality and its representation as a computational model. It should be noted that any model is always simplification by definition; social reality is simply too complex to be modelled as such and if everything would be included in the model, it would cease to be a model. Legal knowledge, like any specialised human knowledge, is usually presented through natural language, either spoken or written. Natural language has thus been the casual

7 From the Finnish perspective see e.g., Kaarle Makkonen, Zur Problematik der juridischen Entscheidung. Oikeudellisen ratkaisutoiminnan ongelmia: eine strukturanalytische Studie. Rakenneanalyyttinen tutkimus. Turun yliopisto 1965; Jorma Kuopus, Hallinnon lainalaisuus ja automatisoitu verohallinto : oikeustieteellinen tutkimus kansalaisen oikeusturvasta teknistyvässä valtionhallinnossa. Lakimiesliiton kustannus 1988; Tomi Voutilainen, ICT-oikeus sähköisessä hallinnossa: ICT-oikeudelliset periaatteet ja sähköinen hallintomenettely. Edita 2009.

observer's entrance point to the expert's internal reasoning that precedes explication through language.

At the same time as it is causing problems for computational modelling of law, the ambiguity of natural language provides for much of the flexibility necessary for legal practices. Ambiguity is, so to speak, the safety valve of the legal system. Through interpretative flexibility embedded in abstract legal norms, the legal systems create space for discretion in legal decision making. For example, by emphasising the objectives of regulation instead of literal application, legal decision making can be context-dependant case-by-case assessment when necessary. Laws' reflexivity, which is the product of thousands of years of legal practices across all human societies, can be seen as the means for handling uncertainties and unknowns within the legal system. This flexibility, complexity and ambiguity of language (e.g. we can both understand the word 'justice' completely differently but still have a conversation about it) impose challenges for AI development, a linguistic threshold that is seldom taken sufficiently into account. Nevertheless, understanding the complexity of any given domain constitutes a prerequisite for automation, be it through rule-based systems or neural networks. Thus the development of feasible AI applications requires collaboration between developers and domain experts such as legal professionals to ensure that too much complexity is not lost through computational modelling.

Traditionally, knowledge representation through natural language has imposed almost insurmountable challenges for early AI development, as described above. In this sense, new AI techniques do, in fact, constitute a way forward. Neural networks are particularly suitable for recognising patterns in vast data flows and thus provide means for observing emergent action, to analyse with statistical

methods the correlations and interdependencies embedded within the data.[8] Whereas the early rule-based Expert Systems in the 1980s required a human intermediary to take charge of formulating the rules for the system's operations, trained neural networks have no such need for human intervention. Simply put, they are much more autonomous in this regard. As it is, you win some, you lose some. Although neural networks are able to overcome some of the insurmountable obstacles natural language posed for rule-based systems, a different set of problems emerge with these new techniques.

During recent years so-called deep learning, i.e. multilayer neural networks have been applied even to give rise to emergence to implicit knowledge and problem solving in a manner that can be called intuitive, at least in a metaphorical sense of the word. These methods are often referred to as data-driven technologies, as the internal view the models create over a given e.g. the legal domain depends on the data given to them. Although these autonomous and data-intensive AI methods are able to address problems related to quantity, over which rule-based systems were not, they falter when it comes to quality of modelling social reality. The expression "garbage in, garbage out" has become ubiquitous, reminding that the selection of data is an essential task.[9] Moreover, human understanding and decision making is based

8 Self-evidently, data is not objective although we often insinuate this: data is created, produced, categorised and managed within information processes and architectures that also define what types of data can be utilised. One of the focal problems related to the subjectivity of data follows from our assumption of its objectivity, that by accessing data we can access the truth. We return to subjectivity later on in section 3. See also Christiane Floyd – Heinz Züllighoven –Reinhard Budde – Reinhard Keil-Slawik, Software Development and Reality Construction. Springer-Verlag 1992; Natascha Just –, Michael Latzer, Governance by algorithms: reality construction by algorithmic selection on the Internet. 39(2) Media, Culture & Society 2017, 238–258.

9 For example, see Bininda-Emonds et al, Garbage in, garbage out, p. 267–280 in Olaf R. P. Bininda-Emonds (ed.), Phylogenetic supertrees. Springer 2004.

on multiple levels that are formed both socially and over long periods of time. This cultural capacity is not available for AI systems that view the world in a rather flat way even in the case of deep learning architectures.

The nature of these algorithms leads into a situation in which their behaviour is difficult or impossible to predict and explain in detail. This has been always true to even larger extent also with humans, but we have come to terms with this property of human cognition to the extent that we no longer question it. As machines increasingly portray similar capacities, the situation needs to re-evaluated: how should the society, through its steering instrument of law, react to the potential and challenges of these new AI applications? Within legal research, the question is often formulated in terms of regulation and governance of technologies: how do we ensure the protection of fundamental rights when AI applications are used across society? Are current legal instruments sufficient for addressing the evident shortcomings of algorithmic models discussed under the AI ethics and algorithmic fairness debates? If new instruments are developed, should they be addressed towards states, organisations or markets, private individuals such as programmers or consumers, or corporate actors like technology companies? And ultimately, are legal conceptualisations of agency still valid, when decision making is no longer directly linked with human decision makers? In the next section, we describe briefly some of the reactions and answers legal scholarship has discussed in relation to AI applications in law.

2.2 LEGAL SYSTEM REACTING TO AI: FROM STATISTICAL METHODS TO ALGORITHMIC FAIRNESS

Current AI methods present a complex set of issues for legal scholars and practitioners alike and many aspects still remain largely under-theorised in socio-legal scholarship, although not for the lack of trying. There has been a multitude of research on the impact statistics, computers, automation and AI have on law since the early history of electronic computing in the 1940s. Early scholarship was influential in establishing law and technology as an acceptable topic in legal research and provided some of the early conceptualisations of the relevant research questions and methods. Also, the need for interdisciplinarity was usually acknowledged as a prerequisite for research on the intersection of law and technology.

For example, the use of statistical methods, which also most current AI applications lean on, has been discussed in relation to law already in late 1940s and early 1950s under the auspices of 'jurimetrics', which became particularly influential in the US and Brazil. Its beginnings are often associated with American lawyer Lee Lovinger's article from 1949, in which the author strives for an economic analysis of law.[10] Early jurimetrics "mainly concentrated in three areas: electronic data storage and retrieval; behavioural analysis of decisions; and the use of symbolic logic", as the late Professor Hans Baade described in his 1963 article.[11]

Similarly, the use of computational methods to model legal decision making has been discussed in legal informatics, a tradition that emerged

10 Lee Loevinger, Jurimetrics: The Next Step Forward. 33(5) Minn. L. Rev. 1949, pp. 455–493.

11 Hans W. Baade, Jurimetrics: Foreword, 28(1) Law & Contemp. Probs. 1963.

in the 1950s and expanded decades until late 1990s.[12] Early work on legal informatics was particularly interested in conceptualisations of information and access to legal information and in developing information retrieval systems and data-bases to these ends.[13] In German-speaking legal culture legal informatics was in the beginning closely linked with administrative automation,[14] an emphasis that was also embraced in the Nordic tradition.[15] In the Nordic countries legal informatics has been particularly influential in formulating the growing importance of information architectures, establishing law as an information architecture and deciphering boundaries of legal decision making. Furthermore, the Finnish legal informatics discussion in the 1990s gravitated towards doctrinal self-reflection of legal research,

12 For example, see Josep Aguiló-Regla, Introduction: Legal Informatics and the Conceptions of the Law, p. 18–24 in Richard Benjamins –Pompeu Casanovas – Joost Breuker – Aldo Gangem (eds.), Law and the Semantic Web, Legal Ontologies, Methodologies, Legal Information Retrieval, and Applications. Springer-Verlag 2005. The subject has especially been researched in Europe, see Hondius Frits, Data law in Europe. 16 Stan. J. Int'l L. 1980, p.87–111. In Finland, Ahti Saarenpää has been one of the leading researchers in the area, see Ahti Saarenpää, Oikeusinformatiikka, p. 1–82, in Risto Haavisto (ed.), Oikeusjärjestys 2000 - I osa. Lapin yliopiston oikeustieteellisiä julkaisuja 2005.

13 On information retrieval systems, see Jon Bing, Let there be LITE: a brief history of legal information retrieval, 1(1) European Journal of Law and Technology 2010.

14 See e.g., Karl Zeidler, Über die Technisierung der Verwaltung. C. F. Müller 1959; Herbert Fiedler Rechenautomaten als Hilfsmittel der Gesetzesanwendung. Deutsche Rentenversicherung 1962; Niklas Luhmann, Recht und Automation in der öffentlichen Verwaltung. Duncker & Humblot; Auflage: 2., unveränd. 1997.

15 For example, see Cecilia Magnusson Sjöberg, Rättsautomation: särskilt om statsförvaltningens datorisering. Norstedt 1992; Peter Wahlgren, Automation of legal reasoning: a study of artificial intelligence and law. Kluwer Law and Taxation Publishers 1992; Kuopus 1988; Voutilainen 2009.

trying to define its identity and status within the hierarchy of legal disciplines.[16]

Sometimes considered a subfield of legal informatics and at times a separate tradition, AI & law research combined computer science with the legal domain. In a special issue of Artificial Intelligence and Law in 2012, Professor emeritus Trevor Bench-Capon of University of Liverpool et al. provide a comprehensive overview of the field's development during 25 years of AI & Law conferences organised since 1987.[17] The articles reprinted and revisited in the special issue demonstrate how computational modelling of legal decision making has been, if not the Philosopher's stone then at least a very popular and long-lasting research topic in the field.[18] In the 1980s most models were rule-based systems that required human intermediary to program the commands that the system would then execute. During the years and decades, AI & Law contributed to increasingly nuanced understanding about computational modelling of law and the accompanying challenges. Much research approached modelling by developing legal expert systems, which would replicate the way in which a legal professional

16 See e.g. Ahti Saarenpää: Does Legal Informatics Have a Method in the New Network Society?, p. 51–75 in: Ahti Saarenpää – Aleksander Wiatrowski (eds.), Society Trapped in the Network: Does It Have a Future? University of Lapland 2016. On research topics within Nordic legal informatics, see e.g., Cecilia Magnusson, Juristen och datasäkerheten. Norstedts 1985; Ari Koivumaa, Nätets juridik. Jure 2000; Peter Seipel, Rätten och säkerheten i IT-samhället. Jure 2006. On the development of information law and the identity of legal informatics see e.g., Kuopus 1988, s. 16–25.

17 Trevor Bench-Capon et al., A history of AI and Law in 50 papers: 25 years of the international conference on AI and Law. 20(3) Artificial Intelligence and Law 2012, p. 215–319.

18 For example, the first conference regarding AI and Law was held in 1987, see Brench-Capon 2012, p. 219. It's also worth mentioning that the first Finnish dissertations of the topic were conducted in 1965 and 1988 by Makkonen and Kuopus, respectively.

would apply the law based on her experience and intuition.[19] Another line of research aimed to represent law through the formalisation of legislation. However, several features of law hindered progress; complexity, factual and legal uncertainties as well as the dynamics of legal change have been identified in recent literature as some of the focal challenges legal expert systems faced.[20]Although some authors advocated for general theory development as a prerequisite for the field's further development, such systematisation and conceptualisation efforts have not yet been able to produce a lasting influence on mainstream legal scholarship.[21]

Unfortunately, but not surprisingly as it is so often the case with new research traditions, many of the early findings remained within the boundaries of the newly established specialised fields and mostly did not find their path into mainstream legal scholarship. It is likely that this relative isolation from other legal fields, the methodological detachment from legal dogmatics often necessary for interdisciplinarity, and generational changes affecting knowledge transfer all contributed to the fact that many of these early successes have been forgotten by later researcher generations.[22] The decline of interest in legal informatics has been described in an introductory article to a special issue on the history of legal informatics from 2010, in which Professor

19 See eg. Richard Susskind, Expert systems in law: A jurisprudential approach to artificial intelligence and legal reasoning. 49(2) The modern law review 1986, p. 168-194.

20 Charles Stevens – Vishal Barot – Jenny Carter, The Next Generation of Legal Expert Systems – a New Dawn or a False Dawn? International Conference on Innovative Techniques and Applications of Artificial Intelligence, p. 439–452.

21 Peter Wahlgren, A General Theory of Artificial Intelligence and Law, p.79–92 in A. Soeteman (eds.), Legal knowledge based systems JURIX 94: The Foundation for Legal Knowledge Systems. Koninklijke Vermande 1994.

22 See e.g., Riikka Koulu, Digitalisaatio ja algoritmit - oikeustiede hukassa? 7–8 Lakimies 2018, p. 840–867.

emeritus Paliwala of University of Warwick describes how legal informatics has evolved over the decades but simultaneously reflects on the field's shortcomings: "many of the contributors to this volume sense a crisis; that the many achievements chronicled in this volume are paralleled by stories of promise not fulfilled, of pathways not followed, of wrong pathways followed."[23]

In any case, from the late 1990s and early 2000s research started to shift away from legal informatics, as the mainstream popularisation of Internet in the form of World Wide Web created the demand for research on new digital environments and actors "on the Information Superhighway" and in "cyberspace", to use the 1990s terminology. At the time law and technology research gave rise to new emergent fields such as information and communication law as well as encouraged research within established legal subfields such as copyright law, criminal law, and constitutional law, among others.[24] This intra-subdisciplinary shift is also reflected in current legal research on the implications of AI applications, the examination of which often adopts a monodisciplinary perspective of individual legal subdiscipline instead of to the overarching umbrella disciplines such as legal informatics or AI & Law. For example, a copyright scholar might be drawn to a re-examination of the concept of authorship when art is created with the help of AI application, whereas a scholar of administrative law might focus on interpretation of administrative law principles in AI-based automation of public administration. Researcher interested in

23 Abdul Paliwala, A History of Legal Informatics: An Introduction to the Special Issue. 1(1) European Journal of Law and Technology. Available at <http://ejlt.org/article/view/21/38> accessed 27.6.2019.

24 See e.g., Taina Pihlajarinne, Tunnusmerkin suoja verkkotunnuskäytössä. Edita 2009; Riku Neuvonen, Sananvapaus, joukkoviestintä ja sääntely. Talentum 2005; Päivi Korpisaari, Uusi tietosuojalainsäädäntö. Alma Talent 2018.

transport law might be interested in assessing the risks of autonomous AI-monitored cargo traffic, all while maintaining a distance to the others due to (sub)disciplinary boundaries. Simultaneously, many intersecting theoretical questions as agency of technical systems and responsibility for algorithmic decision making are often left undiscussed.

Later on, even more nuanced approaches have been developed, such as law, technology, and society studies, which aim at placing the impact of digital technologies in their social and societal context, and applications of Science and Technology Studies (STS) framework, which finds its logical connection with law in credibility of facts and production of legitimacy in the modern world.[25] These approaches have further elaborated the complexity and ambiguity related to the use of digital technologies within the legal system and acknowledged the need for comprehensive and interdisciplinary legal scholarship, although particularly STS tradition has questioned the feasibility of overarching general theories that would catch the entirety of technological development. One recent addition to the debate on law and technology can be found in the growing body of literature on legal tech, a more practice-oriented field focusing mostly on legal profession and the influence digital technologies have for law firms, legal service production, and legal work.[26]

Still, despite these efforts and progressively expanding current scholarship, many issues related to algorithmic decision making remain unsolved both on practical and theoretical level. For example, the use

25 Sheila Jasanoff, Dreamscapes of Modernity Sociotechnical Imaginaries and the Fabrication of Power. University of Chicago Press 2015.

26 Markus Hartung – Micha-Manuel Bues – Gernot Halbleib (eds.), Legal Tech A Practitioner's Guide. Beck C. H. 2018; Markus Hartung – Micha-Manuel Bues – Gernot Halbleib (eds.), Legal Tech: Die Digitalisierung des Rechtsmarkts. Beck C. H. 2017. Stephan Breidenbach (ed.), Rechtshandbuch Legal Tech. Beck C. H. 2018.

of historical data that many algorithmic models rely on might prove out to be problematic from the perspective of legal decision making particularly if past performance of others is used to predict the future performance of an individual. One issue that would deserve further-reaching examination is how this temporal quality of using historical data to predict the future is conceptualised in application of law, and to which extent such descriptive data can be used as the basis for prescriptive statements?

Another challenge might signify a return to the eternal question already discussed both in legal informatics as well as AI & law: how do we conceptualise legal decision making for computational modelling? Do the advances in computational power, data storage and availability of big data provide new insights into old impasses? In this sense, current algorithmic models can be used as a mirror to reflect on human decision making and to dissect the underlying conceptualisations about what constitutes a decision. Perhaps it will be revealed that the legal system operates on the assumption of anthropocentric law and attributes only to human actors the role of decision maker, assigning to them liability for false decisions and responsibility for effective redress mechanisms and production of legitimacy?

Despite doctrinal fragmentation and the increasing complexity of societal digitalisation, legal scholarship might be able to provide its two pennies worth in the ongoing debate on AI ethics. In recent literature, the AI ethics debate has been criticised - quite correctly one might state - for its vagueness and lack of concrete solutions, which often leads to reintroducing industry self-regulation as the gold standard for technological governance.[27] True enough, at a quick

27 E.g. Thilo Hagendorf, The Ethics of AI Ethics -- An Evaluation of Guidelines. arXiv preprint arXiv:1903.03425.

glance many recent AI guidelines seem to interconnect with the legal regime. For example, many such framework documents emphasise that AI development needs to be in compliance with fundamental rights and legal frameworks - without further elaborating what this actually would entail, while also listing ethical principles from human autonomy to transparency and fairness. Interestingly enough, many principles of fairness-aware or trustworthy AI are well established legal principles that have been interpreted and elaborated both in research and case-law.

The advantage of legal interpretation is that, unlike inherently unsolvable ethical dilemmas, the legal regime produces nuanced interpretations what exactly constitutes as fair or transparent within a given context. Hence, the legal system has a lot to offer to debates on algorithmic fairness; comprehension about the complexity and context-dependency of fairness, criteria for its evaluation on case-by-case basis, and procedural mechanisms that structure such evaluation. In addition, the legal system has a unique focus on the production of justification, the legitimacy creation necessary for trust towards organisations and institutions. And finally, the legal system also provides a diverse set of tools for executing fairness standards, for example through national or regional regulation or multilateral conventions, through procedural safeguards and monitoring mechanisms. Hence, we argue that law is vital for ensuring fairness-aware AI.

This being said, it is obvious that many of the suggested solutions for unfair algorithms, e.g. algorithmic transparency, justice by design, or human-in-the-loop, are not simply legal or technical solutions but instead hybrids, that can only be created through collaboration of different actors and fields. This again leads us to the same simple conclusion that we need interdisciplinarity. But if interdisciplinarity

has for decades been advocated as the only viable way forward what actually keeps us from it?

3 SECOND ROUND: MAPPING OUT SOCIAL REALITY AND DEALING WITH COMPLEXITY

3.1 FROM SOCIAL REALITY TO MODELLING

The lack of common language often pops as the reason why interdisciplinary research is so challenging. In this section we delve a bit deeper into language and meaning and how the language we use reflects the different ontological and epistemological starting points of natural sciences and social sciences. Simply put, language provides access to our perception of reality and to our comprehension of knowledge: what is the world and what can we know about it. This means that the difficulties of interdisciplinary dialogue can at least partly be explained by the differences in the disciplines' ability to reflect their relationship with social complexity and uncertainty. Each computational model is a representation of a complex and uncertain reality and thus by definition an oversimplification of it: there exists an inevitable distinction between the world and its representation. Here lies also the danger of ontological reductionism if the model is perceived as a fair description of the world.

However, natural sciences in general and statistics in particular are often seen to encompass a rather narrow understanding of social complexity, whereas in social sciences there is a long-standing track record of reflection on subjectivity of knowledge production. For example, sociology of knowledge pioneered by French sociologist Emile

Durkheim among others in early 20th century mapped out how social reality influences production and formulation of knowledge, which ideas the American-Austrian sociologists Berger and Luckmann made accessible for mainstream application in their 1966 book The Social Construction of Reality.[28] Furthermore, the turn to technology in social sciences in the 1970s signified a growing interest in making sense of ongoing technological transformation of the society,[29] although since then the tradition has faced its fair share of criticism for not being sufficiently informed about technology and thus providing only very limited understanding of relevant issues.[30]

This is to say that the distinction between natural sciences and social sciences based on the fields' ability to manage social complexity is also a simplification. Despite several discussions in social informatics and related fields that have sought to elaborate the social dimension of technology,[31] much of this research has remained in the margins. Hence, we argue that historically this simplification has been a fair description, as natural sciences have not had as pressing a need to grasp this social complexity during the previous AI booms, partly because of the limitations of rule-based systems in representing the

28 Peter Berger – Thomas Luckmann, The Social Construction of Reality: A Treatise in the Sociology of Knowledge. The Penguin Press 1966.

29 Steve Woolgaar, The Turn to Technology in Social Studies of Science, 16(1) Science, Technology & Human Values 1991, p. 20–50.

30 Langdon Winner, Upon Opening the Black Box and Finding It Empty: Social Constructivism and the Philosophy of Technology. 18(3) Science, Technology & Human Values 1993, p. 362–378.

31 On social informatics see e.g., Enid Mumworth, Effective Systems Design and Requirements Analysis: the ETHICS Method. Macmillan 1995; Rob Kling – Howard Rosenbaum – Steve Sawyer, Understanding and Communicating Social Informatics: A Framework for Studying and Teaching the Human Contexts of Information and Communications Technologies. Information Today, Inc. 2005. Similar themes have also been at the core of the IFIP working groups and conference, https://networking.ifip.org/ (accessed 23.8.2019).

world and the lack of mainstream applications. Still, there exists a danger of reductionism when social complexity is modelled according to binary logic. There are, though, interesting and potentially applicable developments within logic that may approve useful with regard to the conceptuality and subjectivity.[32]

In section 2.1 we described the shift from rule-based systems to machine learning techniques that provide new insights into modelling through quantification. Increases in computational power, decreases in data storage costs, and advances in AI techniques contribute to a broader automation and datafication of the society. It is likely that machine learning and neural networks provide a new entrance point to the sporous human speech and the eternal ambiguity of language and reintroduce the social complexity to world presentation. This renewed focus on language also entails the necessity to detach from the limitations inherent in traditional natural sciences approaches, where the world presentation is based on assumptions about logical, rational and unambiguous reality with clear-cut causality. And here's why this is important: the computational methods used to create presentations of the world in the form of an algorithm directly dictate what are the limits and boundaries of the model, the quality of the representation so to say.

In other words, the computational modelling and resulting presentation are dependent on the choice of techniques. For example, is social complexity reduced into a computational model based on Bayesian statistics, which produce probabilities with statistical methods, or is the modelling built on fuzzy set theory, which sheds light on the relationship between language and reality? These approaches should not be understood as conflicting but more as complementing

32 Patrik Eklund et al., Semigroups in Complete Lattices. Springer 2018.

perspectives. Fuzzy set theory enables more nuanced and multi-valued approach to modelling. It is an answer, for instance, to the Sorites paradox.[33] With the use of fuzzy sets, drawing a strict line is not necessary. The word 'fuzzy' is somewhat unfortunate as it refers to a more accurate representation of the relation between language and world than what two-valued logic can provide.

It is noteworthy that fuzzy sets and probability theory serve in different tasks. In statistical analysis and reasoning, frequentist and Bayesian approaches may be considered to be the two main alternatives. They both have been used as basis for constructing statistical machine learning algorithms. In addition, information theory has been used as a firm theoretical basis for the development of algorithms. When these methods are applied, the data is typically numerical from the beginning. The focus of fuzzy set theory, on the other hand, is in the relation between linguistic and mathematical representations: to put it simply, between words and numbers. A qualitative description of the world with language is a considerably more complex phenomenon than analysis of numerical measurements that are readily available for mathematical and statistical analysis.

Mathematically and statistically oriented analysis of text corpora has long roots in AI development. It follows that there are many approaches to how texts can be transformed into mathematical representations. For instance, one may count how many times different words appears in a text and conduct analysis based on these word distributions. The word distributions are, however, of quite limited use by themselves. Much more useful analysis becomes possible when words and texts

33 Sorites paradox is a language related paradox that is related to vagueness. For example, the question of at what point can individual grains of sand form a heap can be described as a sorites paradox. See eg. Dominic Hyde, The Sorites Paradox, p. 1-17 in Giuseppina Ronzitti, Vagueness: A Guide. Springer 2011.

are considered in the context of other words and texts, in relation to each other. Much related to word meaning and their relationships can be deducted based on the word co-occurrence statistics. In a large collection of texts such as pieces of news, it is more probable to find the word “judge” more often in the same document with the word “court” than with words such as “leisure” or “beach” which may, on the other hand, appear together relatively more frequently. When large or vast collections of documents are analysed, fine grained representations of semantic relations between words can be gained.

The methods for analysing text corpora are often such as mentioned above, i.e. statistical machine learning. The fuzzy sets do not belong to that set of methodologies, but they give a framework to represent accurately the relationship between words and the world the words refer to. The reasoning based on fuzzy logic has been abandoned or has never been used by many researchers in machine learning because of the associated theoretical problems. In addition to the algorithms build on statistical or information theory basis, inspiration gained from natural systems has been the starting point for development of many methods. In particular, our gained understanding of the functioning of human brain has given ideas and inspiration for the development for artificial neural networks, often called simply neural networks. These methods are accused by some researchers to lack proper theoretical bases that might, for example, lead into problems related to how trustworthy and explainable the results are gained using the neural networks.

Currently, the most popular approach is deep learning, which refers to the use of multilayer neural networks. These are able to learn both representation and reasoning models from the data given to it. Perhaps to the best known example of deep learning is related to

playing games such as chess and game of go. These games are simple in the sense that they are fully rule-governed. There is no uncertainty in the environment except for the moves by the opponent, the context is not changing, there is no ambiguity or emergence involved, and the reality is very clear-cut. The success of the AlphaGo in the game go and AlphaZero in chess are still noteworthy. In 1990s, the Deep Blue system won the world champion Garry Kasparov. The approach can be called brute force calculation. The system went through a vast number of chess position and found better moves that the human best player. As there are many more positions in chess that can be analysed by any current and most likely computer, the forward looking was ended when some expert programmed limits were reached. In 2018, the Alpha Zero system won overwhelmingly the best follower of Deep Blue. This system, Stockfish lost so dramatically that some people gave statements that there must be some kind of scam involved. This was not the case and it is noteworthy that the AlphaZero system was praised for its intuitive and creative style of play.

If nothing else, this may be considered to be a relevant example of dealing with rule governed systems and phenomena. Alpha Zero did not build any rules to give it principles of behavior. The behavior is based on the complex “neural” network structure that it uses for decision making in each position separately. The structure of the neural network is result of playing 9 hours against itself, just by the given rules of chess. In other words, the system was not instructed by humans by any content-related manner. This is also the reason the example is interesting from the perspective of modelling emergence. Because the conceptual input from human developers was limited to the bare framework of chess rules, the functional intelligence resulted from emergent behaviour of the model. Although emergent action in

chess play is very narrow compared to the social complexity in broad societal areas such as the legal system, the example sheds light to how social processes could emerge if artificial actors are equipped with virtual experience of relevant social context. In the sense of emergent behaviour, the Alpha Zero system may be considered to be closest to so-called artificial general intelligence we have seen up to now.[34] In this sense, emergence portrayed by artificial actors could offer new insights also to modelling legal decision making.

An obvious conclusion is that these systems would do much better in the legal domain than the rule-based systems programmed manually, if suitable data is available. The complexity of reality cannot, however, be modelled this easily. A potentially useful application in the legal domain could be in building simulations of multiagent systems and testing what kind of emergent results can be observed when different versions of the rules are experimented with. In this set-up, data could be collected actively from people that could provide their replies in specific contexts, although data protection does impose certain limitations to overall collection of data. Of course, it must be stressed that we do not consider chess or other games for that matter to be a sufficient analogy for legal complexity or a roadmap to future AI development in the legal domain, as is obvious from the societal importance of legal decision making. These methods can, however, be applied, at least in principle, in a non-reductionist manner, and thus could facilitate new ways forward also for modelling legal decision making.

34 See eg. Ben Goertzel – Cassio Pennachin (eds)., Artificial General Intelligence. Springer 2007.

The problems that may raise from the use of machine learning in complex real world contexts can be exemplified by the infamous COMPAS case that has spawned a multitude of research into algorithmic discrimination both in data science and law. The algorithmic model was used in criminal cases in lower courts in many US states, to assess the recidivism score of defendants. The newly emerged interest in algorithmic discrimination was fueled by two related events. In May 2015 the independent news media ProPublica published an exposé on machine bias in recidivism score software that demonstrated the algorithms produced systematically higher scores for black defendants when compared with scores of white defendants.[35]

The discussion's legal dimension was articulated through legal proceedings, when a defendant in a criminal case called Eric Loomis contested the court's judgment from 2013 in which the court held him to be a danger to his community based on an algorithmic risk assessment.[36] The defendant argued that the use of the proprietary software was an infringement of his due process rights, as the methodology behind the score was not disclosed to the court nor the defendant based on the software company's trade secrets. In its decision in 2016, the Wisconsin Supreme Court stated there had been no due process violation, as the algorithmic score did not form the sole basis for the court's decision. The court then proceeded to advise judges on the use of risk assessment software, stating judges must give

35 See Angwin et al. 2016.

36 State v. Loomis, Wisconsin Supreme Court Requires Warning Before Use of Algorithmic Risk Assessments in Sentencing. Harvard Law Review 10.3.2017. Available at https://harvardlawreview.org/2017/03/state-v-loomis/ accessed 27.6.2019.

additional grounds for sentencing beside the risk score and elaborated that such assessment procedures should incorporate some warnings for judges about their limitations. After the Wisconsin Supreme Court's decision, the defendant appealed to the US Supreme Court, which denied the petition after an amicus brief from the United States in June 2017.

When algorithmic models are used to produce a recidivism score, this entails prediction of the future but as future cannot be known before it happens, the models operate on probabilities based on factors derived from different sources of data (in the Loomis case, statistical public data in addition to data provided by the defendant). It should be noted that dangerousness cannot be quantified but when the algorithmic model is built, decisions are made on which factors are used in its place. This ambiguity of language, what it means to be dangerous in the legal sense of the word, is something that could perhaps be approached with fuzzy set theory. An additional problem raised from the fact that different people may understand the meaning of some world in a different way that others. If the difference in interpretation among two or more people is considerable, serious problems may arise. Here, we do not refer only to ambiguity of natural language but also to more fine-grained differences in interpresentation of words and expressions. We will discuss these challenges and potential solutions in detail in the following section.

It should be noted that the legal system has developed its own procedural and material mechanisms for handling uncertainties and social complexity. One central mechanism for uncertainty management is the distinction between routine cases and cases that require discretion. There is an inherent danger of reductionism when automation is implemented in discretionary cases, the old wisdom

carries, because by automating such decision making, we might simultaneously render existing mechanisms of complexity reduction dysfunctional. At the same time, however, we should acknowledge that human decision makers are not necessarily qualified to assess hidden societal correlations and causalities. Are we imposing different standards for human and non-human decision making?

When we accept that both human and non-human decision making is always subjective in the end, perhaps we can then perceive that the actual problem is not the subjectivity of algorithms but instead our lack of acknowledgment of it? We are well aware that our judges are humans and thus are by no means infallible, but do we still unconsciously expect our technological tools to be less subjective than we are? It seems that we often still assign objectivity to technology and by doing so end up renewing and reinforcing the dichotomy between human/machine, where the first is considered subjective and the latter objective. This leads us back to pondering what is the world and what can we know about it? What is the difference between the world and its presentation through computational modelling?

At the same time, we are able to perceive that the human/machine distinction is reintroduced in AI ethics debates, but this time with different roles cast to human and non-human actors: many AI guidelines advocate for human agency as a necessary safeguard against unforeseeable implications of AI systems. The ideas behind human-in-the-loop, human oversight and human-centric design approaches reflect a need to engage humans in algorithmic decision making in order to ensure fairness and thus ultimately justify decision making. This connection between human agency and legitimacy of legal decision making should be investigated further. Hence, the feasibility of these approaches should be critically assessed before they are

implemented into governance models, as they may not provide the intended solutions to the problems that are considered a priority but instead might lead astray due to the encompassed theoretical baggage. What, then, would follow if we would construe the use of algorithms not as an either/or choice between human-faced or algorithmic decision making but instead we would perceive automation in terms of interaction between humans and machines?

4 THIRD ROUND: THE PROMISE OF FAIRNESS-AWARE AI AS INTERACTION BETWEEN HUMAN AND MACHINE ACTORS

Traditional computational modelling of social complexity requires simplification, which results from the subjective choices of those involved in the process. In the previous section, we discussed different AI methods used for dealing with complexity and argued that neural networks might provide new possibilities for modelling legal decision making and thus perhaps overcome some of the shortcomings of early rule-based systems. We also discussed how the distinction between human-faced and algorithmic decision making reinforces the dichotomy of human/machine and the belief in objectivity of computational methods and argued that the adoption of AI development would better be framed as collaboration instead of substitution. In this section, we return to the risks and possibilities of machine learning applications in law and the need for algorithmic fairness.

The negative societal consequences of algorithms as well as the public and academic debate on AI ethics demonstrate that we need to acknowledge the limitations of statistical methods in

describing our social reality. The advantage of this recently acquired and unpleasant comprehension is that it steers practical as well as theoretical AI development as well as scientific research on algorithmic fairness increasingly towards interdisciplinarity, particularly towards collaboration between social sciences and computer science. Successful representation of the world as a computational model is dependent on translation between the social complexity and computation. Thus, the advances in AI techniques during the last decades do not suffice for modelling by themselves need to be complemented by understanding of the underlying ambiguity and complexity of natural language.

What are the limitations of machine learning algorithms in modelling social complexity? One way to study the qualities and effects of machine learning is to divide them to supervised, unsupervised and reinforcement learning systems.

Supervised learning refers to the practice according to which the algorithm is trained by providing collection of pairs of inputs and correct outputs. The training aims at finding a model that gives best possible output for unforeseen inputs. As an example, one could mention a system that classifies incoming messages into categories like decisions, employee requests, administrative hearing materials and others. In the training phase, the system would be given examples of texts that belong to one of these categories. Each document is first pre-processed to numeral representations (vectors) and then given as training data to the machine learning system. After training the system classifies new incoming documents into one of the categories. The results of such supervised machine learning algorithms depend on multiple factors. How large and representative is the training data collection? Does the data cover all the relevant aspects of the phenomenon at hand? How well chosen is the algorithm for the task? How are the parameters

of the algorithm chosen? Are there enough computing resources available? The answers given to these questions reflect the subjective decisions made by those involved in the design and development of the model, which are then embedded into the algorithms. Hence, the modeling of the world based on machine learning is not objective in any true sense of the word.

Potentially the most serious problem related to the supervised learning is the categorization itself. Namely, many phenomena are continuous in their nature. The borderline is drawn in a manner that forces the items to be put into one of the classes. Let's take a simple example. People are characterized by three values. We can call these three A, B and C. In the real world these variables could be age, income and debts. We can take A as those people for whom loan is given automatically, B those who are checked manually and C those whose application fails based on the decision by the classifier. When classifiers are used, there are always borders that have been drawn as well as cases that are very close to each other in the real world but are divided into A and B or B and C. The algorithmic decision making may fail even in a miserable way if the number of categories is unreasonably low or if the data do not contain all relevant variables.

In unsupervised learning, the algorithm is given only the input and its task is to find patterns, structures or relationships in the data. In other words, no categories are defined as a conceptual basis for the learning process. Statistical clustering is one form of unsupervised learning. Among the neural network models on unsupervised learning, the self-organizing map (SOM) has become the most popular model. The SOM is widely used for data analysis and visualization in many

application areas.[37] The unsupervised learning approach applied on text data is comparable with qualitative research.[38] The representation of words as numerical vectors provides interesting opportunities also for qualitative research. When unsupervised learning is applied the conceptual representation of the phenomenon is not predefined as is done when supervised learning is applied.

Acknowledgment of the inherent subjectivity of machine learning techniques may help us overcome the deeply rooted belief in the objectivity of computational information processing. This, in turn, may facilitate better identification of the societal issues involved in increased use of algorithms. Also, it might produce reflection on the similarities and differences of human and algorithmic decision making and, while doing so, advance our understanding of human reasoning and communication in the hopes of translating such insights into fairer decision making in general. In the end, algorithmic decision making models can be understood as different techniques for automation of certain parts of human-driven processes. Thus we can inquire what is the promise of AI techniques in improving the quality of human decision making: for example, supervised machine learning applications could reveal unconscious discriminatory patterns and provide a more elaborated understanding of social issues involved. To this end, intricate power relations might play a role in social

37 SOM has served as a sketchboard for considerations of social and cognitive phenomena. For example, the model can be employed to simulate how communal language systems emerge as a result of interaction between different actors, who all operate based on their unique expectations of meaning and social context. See Timo Honkela – Ville Könönen – Tiina Lindh-Knuutila – Mari-Sanna Paukkeri, Simulating processes of concept formation and communication. Journal of Economic Methodology, 15(3) 2008, 245–259.

38 Nina Janasik – Timo Honkela – Henrik Bruun, Text Mining in Qualitative Research: Application of an unsupervised learning methods. 12(3) Organizational Research Methods 2009, p. 436–460.

interaction without human participants ever become fully aware of them. In addition, AI applications might provide new monitoring mechanisms to govern automated processes as well as to produce more organisational transparency. The human point of view may also help in developing methods and algorithms that help in dealing with tasks and solving problems that stem from real-world situations rather than from the formal abstractions that are often the starting point for development of mathematical algorithms. It is not enough to develop and apply formally proven methods, but they also need to serve their purpose in the real world. This match may not always be strong enough if the algorithm has been developed having some limited model of reasoning and representation in mind. Such a problem may raise, for instance, from a limited view on causality. Thus it may even be necessary to develop new (kinds of) machine learning algorithms for the legal domain and for humanities and social sciences in general.

One potential example to this direction is the Peace Machine concept, developed by one of the authors. The Peace Machine provides a framework for the development of AI applications for social good. The framework consists of three main areas. The focus of the first area is on human and social communication including challenges related to intercultural exchange and problems on how people use language within their personal context. Naturally, different individuals and communities have their own unique systems of language, meaning and concepts due to differences in cultural context and personal experiences. The starting point for the Peace Machine concept is that this cultural and social diversity should be preserved. Unlike earlier attempts on intercultural exchange that aim at common formalizations through formal logic or universal linguistic systems such as Esperanto, the Peace Machine proposes the concept of machines

engaged in meaning negotiations. The ultimate objective is that such AI applications within language translation would enable interpersonal communication despite subjective differences in meaning, by giving support to an individual's ability to read the other's intention, which is often embedded in social context. In this sense, emergence could be used to comprehensive top-level analysis of how language and meaning come to be. Within the legal domain such comprehensive linguistic approach could be employed to analyse the differences between language used by legal experts and laypeople.

The second, parallel area of application is the consideration of using analytical technologies to help people understand their own and others' emotions better. Hypothetically, increased awareness of one's emotional states and ability to reflect one's life in a constructive manner enables empathy and thus helps people manage their daily encounters better both in private life and on a societal level. The third area of the Peace Machine goes beyond the level of interpersonal relations and considers AI applications that would improve access to justice and fairer resource allocation in the society. The third area looks into different application areas ranging from economy and politics to law and public administration, repeating and testing the hypothesis that current and emerging AI applications can, in fact, be used to improve societal processes through introduction of new forms of democracy and participation. Ultimately, the Peace Machine concepts aims to demonstrate the positive potential of current and emerging AI technologies to improve the overall well-being of humans.

Such AI applications could provide new tools for managing uncertainties. However, a word of caution is needed particularly due to the current hype around AI that often contribute to inflated expectations on the technology's abilities. The dystopian images of

technological dictatorship present in some AI ethics debates should not be replaced with unwavering belief in data-intensive AI applications, nor should we overlook the strategic and ideological strains and power dynamics of technological governance and AI development.

As predictions about the future have the tendency to frame what is possible and what is not, there exists a need for realistic but positive interpretations of such possibilities. In the end, as decades of research into computational modelling of law has demonstrated, legal decision making is not simply about application of rules to established facts, structured fact-finding processes, and negotiations between different interpretations. But perhaps emergence-based simulations of human interaction could shed new light into this often overlooked underbelly of legal decision making?

5 CONCLUSION

Interdisciplinary dialogue is not easy: it requires curiosity, respect, and patience, the ability to reflect and to explain one's own perspectives and assumptions even when there is no guarantee of instant gratification, in the hopes that understanding comes with time. Although it may sound conflicting, interdisciplinarity can at the same time save time, as borrowing the expertise and insights from other researchers and their respective disciplines furthers the ability to reflect one's own thinking. However, there lies another danger of reductionism, as dialogue across disciplinary boundaries requires its own complexity reduction.

Here, we have sought to adopt a comprehensive and abstract approach to these questions of legal rules, values and ethics in AI development and the boundaries of computational modelling of law.

Our starting point was the acknowledgment of societal problems associated with the use of algorithmic models and the demand for algorithmic fairness. Algorithmic models are about modelling the world, which comes at a price of simplification through representation. We discussed how information about the world is accessible through natural language that is defined by its ambiguity and flexibility, which also the legal system utilises in order to create simultaneously flexibility and coherence. How, then, do we capture this social complexity into a model without losing too much of this flexibility?

We described the subjectivity of modelling and how the distinction between human and algorithmic decision making derails attention from the potential embedded in current machine learning techniques. Instead of juxtaposing humans and machines,[39] we should delve deeper into collaborative potential of AI techniques; in addition to algorithmic bias we should develop algorithms that enable us to recognise human bias; alongside automation we should develop monitoring schemes. The advances in natural language processing might translate into improved models that take social complexity, ambiguity of meaning, and context-dependency into consideration, and hence are able to avoid the shortcomings of earlier rule-based systems. At the same time, we should not exaggerate the abilities of AI applications nor should we attribute objectivity to the inherently subjective exercise of modelling social complexity.

The positive potential lies in artificial machines interacting with humans, enabling explicit meaning negotiations without losing any of the diversity of human interaction. To this end, the logical next step would be to test the feasibility of the Peace Machine concept for the

39 Market-driven development has contributed to the fact that automation often involves seeking cost savings. See eg. Kuopus 1988, pp. 15, 505.

purposes of the legal domain. Potentially this could be achieved by simulations of the complex interaction that constitute legal decision-making processes, without forgetting the ritualistic and authoritative elements that are vital for their legitimacy. In the end, modelling legal decision making by emergence provides us with a mirror, that enables reflections on what makes decision making fair and reasonable, what meanings do we associate with the elusive concept of justice, and how, despite these differences of meaning, we can contribute to sustainable digitalisation of law.

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Towards AI-Driven Society. A Legal Perspective

1 INTRODUCTION

Last June Legal Tech Lab organized a workshop on artificial intelligence. It had been prepared in connection with the Legal Tech Con 2018 Conference, which explored the use of artificial intelligence in the legal practice, focusing on legal, ethical and practical implications towards the field. The point of this workshop was to create a separate forum for a legal debate that would have two main aims. Firstly, it would allow an overview of the topic of the conference and secondly, it would also start methodological discussions on artificial intelligence.

The workshop aimed to identify the biggest challenges that AI has imposed on law and other fields of research. Since some of the participants did not have a legal background and the invited speakers consisted of both academics and other professionals, the workshop enjoyed an interdisciplinary atmosphere. The workshop gathered together different ways of approaching AI from the legal perspective and exploring what issues are currently being considered by researchers of contract law, competition law, procedural law, administrative law, legal theory, etc.

The workshop hosted several academics, all of whom handled the different practical challenges to the legal application of AI. Dr. Tuomas Pöysti is the Chancellor of Justice in Finland and has been presenting on 'The Realm of Law Extended – Living Together with the Artificially Intelligent Machine'. He is a Docent of Administrative Law at the University of Helsinki and has a strong background in information law and legal informatics with approximately 50 scientific publications.[1] Dr. Dory Reiling is an Independent IT and judicial reform expert as well as a Retired Senior Judge at the Amsterdam District Court. She has published several publications on IT and courts as well as judicial

1 See e.g. Ruxandra Balboa-Alcoreza – Tuomas Pöysti – Ahti Saarenpää – Mikko Sarja – Viveca Still, Tietoturvallisuus ja laki : näkökohtia tietoturvallisuuden oikeudellisesta sääntelystä : tutkimusraportti (Information Security and Law), Valtiovarainministeriö 1997; Tuomas Pöysti. Tehokkuus, informaatio ja eurooppalainen oikeusalue (Efficiency, Information and European Legal Space), University of Helsinki Faculty of Law 1999. See also the following wider articles: Tuomas Pöysti, Trust on Digital Administration and Platforms. Scandinavian Studies in Law 65 2018, p. 321–366; Tuomas Pöysti, Information Policy and Citizens' Communicational Rights as Conditions for Sustainable Fiscal Policy in the European Union, p. 8–53 in Erich Schweighofer – Ahti Saarenpää – Janos Böszörmenyi (eds.), KnowRi§ht 2012. Knowledge Rights – Legal, Societal and Related Technological Aspects. Österreichische Computer Gesellschaft – Austrian Computer Society 2014; Tuomas Pöysti, Information Government in Practice: Functional Gains and Legal Perils. Scandinavian Studies in Law 56 2010, p. 91–124. Tuomas Pöysti, Hallintoeettiset toimintasäännöstöt hyvän hallinnon toteuttamisessa (Ethical Codes of Conduct in the realization of Good Administration), p. 143–157 in Ida Koivisto – Tuomas Ojanen – Outi Suviranta – Maija Sakslin (eds.), Avoin, tehokas ja riippumaton: Olli Mäenpää 60 vuotta juhlakirja. Edita 2010; Tuomas Pöysti, Scandinavian Idea of Informational Fairness in Law - Encounters of Scandinavian and European Freedom of Information and Copyright Law. Scandinavian Studies in Law 50 2007, p. 221–248; Tuomas Pöysti, Communicational Quality of Law, in Cecilia Magnusson Sjöberg – Peter Wahlgren (eds.), Festkrift till Peter Seipel. Norstedts Juridik 2006.

reforms.[2] During the workshop she evaluated on 'AI and courts, hype and reality'. Professor Burkhard Schafer from the The University of Edinburgh spoke about 'Trial reporting, data ownership and legal AI'. He has a strong background in AI and law, theories of legal reasoning as well as regulation of technology. He is also a co-founder and co-director of the Joseph Bell Centre for Legal Reasoning and Forensic Statistics.[3] Other speakers of the conference were professors Mika

2 See, e.g., Dory Reiling, Technology for justice: how information technology can support judicial reform. Amsterdam University Press 2009; Dory Reiling, Technology for Justice - T4J blog in English https://doryreiling.blogspot.com/. Accessed 7.6.2019.; Dory Reiling, Beyond Court digitalization with online dispute resolution. International Journal for Court Administration 8(3) 2017; Dory Reiling, Information Technology in the courts in Europe, in Gottwald (ed.), e-Justice in Österreich, Erfahrungsberichte und europäischer Kontext, Festschrift für Martin Schneider. Editions Weblaw 2014.

3 See Burkhard Schafer, Legal Knowledge and Information Systems, JURIX 2012: The Twenty-Fifts Annual Conference, University of Amsterdam, The Netherlands, 17-19 December 2012. IOS Press 2012; Joanna Wardlaw – Janet De Wilder – Peter Sandercock –Jane Haley – Burkhard Schafer – Robert Rae – Donald Jarvie, What are you thinking? Who has the right to know? Brain imagining and its impact on society. Scottish Universities Insight Institute 2010; Abbe Brown – Burkhard Schafer – Andres Guadamuz – Eliza Walker, E-Consumer Protection: A Publich Consultation on Proposals. AHRC Reseach Centre for Studies in Intellectual Property and Technology Law 2010; Luciano Floridi – Josh Cowls – Monica Beltrametti – Raja Chatila – Patrice Chazerand – Virginia Dignum – Christoph Luetge – Robert Madlein – Ugo Pagallo – Francesca Rossi – Burkhard Schafer – Peggy Valcke – Effy Vayena, AI4People—An ethical framework for a good AI society: Opportunities, risks, principles, and recommendations. Minds and machines 28 2018, p 689–70; Luciano Floridi – Christoph Luetge – Ugo Pagallo – Burkhard Schafer – Peggy Valcke – Effy Vayena – Janet Addison – Nigel Hughes – Nathan Lea – Caroline Sage – Bart Vannieuwenhuyse – Dipak Kalra, Key ethical challenges in the European Medical Information Framework. Minds and machines 2018, p. 1–17; Burkhard Schafer, Formal models of statutory interpretation in multilingual legal systems. Statute Law Review 38 2017, p. 310–328; Burkhard Schafer – Lilian Edwards, "I spy, with my little sensor": Fair data handling practices for robots between privacy, copyright and security. Connection science 29 2017, p. 200–2009; Laurence Diver – Burkhard Schafer, Opening the black box: Petri nets and privacy by design. International Review of law, Computers and Technology 31 2017, p. 68–90.

Viljanen (University of Turku) on 'Insuring AI'[4] and Petri Kuoppamäki (Aalto University)[5] on 'Artificial intelligence, internet of things and competition law'.

Thereafter, other contributors to the workshop were doctoral students: ms. Aduradha Nayak from the University of Lapland presenting on 'In a techno-political horizon: Autonomous AI and electronic personality'. Ms. Nayak has a background in law and philosophy, and is interested in concepts such as posthumanism, transhumanism, artificial intelligence and human genome. Ms. Laura Lassila, a doctoral student from the University of Helsinki, gave a presentation about 'Smart Contract – how to make it legally enforceable', Mr. Leo Leppänen is also a doctoral student from the University of Helsinki and during the workshop he evolved on 'Automated Journalism'. Moreover, other doctoral students from the University of Helsinki presented at the workshop. Among them were Anna Ronkainen (co-founder of TrademarkNow®) on 'Understanding human legal reasoning as a prerequisite for legal artificial intelligence', Vesa Kyyrönen on 'Robotics and machine autonomy from the perspective of international law' as well as Samuel Wrigley on 'Data protection and transparency when computers imitate humans: The problems faced by Google Duplex'. The chairs of the workshop were Dr. Beata Mäihäniemi – post doctoral researcher in law and digitalisation – and Ms. Hanne Hirvonen,

4 See eg. Mika Viljanen, Robotteja vakuuttamassa: autonomiset alukset esimerkkinä. Lakimies 7–8/2018, p. 954–974; Mika Viljanen, Algoritmien haaste – uuteen aineelliseen oikeuteen? Lakimies 7–8/2017, p. 1070–1087; Mika Viljanen, A Cyborg Turn in Law? German Journal of Law 18(5) 2017, p. 1277–1308.

5 See eg. Petri Kuppamäki, Määräävän markkina-aseman väärinkäyttö digitaalisilla markkinoilla - mikä muuttuu? Lakimies 7–8/2018, p. 996–1023; Petri Kuoppamäki, Tying and two-sided digital platforms, p. 307–340 in Paul Nihoul – Pieter Van Cleynenbreugel, The Roles of Innovation in Competition Law Analysis. Edward Elgar Publishing limited, 2018.

doctoral student, both of whom are from the Legal Tech Lab, University of Helsinki.[6]

This article presents the findings of the workshop based on the happened discussion and the abstracts provided by the participants. Since it is based on these sources, it aims primarily at introducing the ideas of speakers but also attempts to find alternative ways of approaching problems, as well as common areas of interest among the researchers. It is divided into two parts. The first part poses questions at the abstract level, such as how the instruments of the legal system can and should react to new ways of using artificial intelligence. In this discussion, it becomes self-evident that regulation is always related to a particular context. The second part of the article illustrates the diversity of these contexts as these are concretized through three particular examples; AI in Courts, automated journalism and smart contracts.

Before addressing the above-mentioned parts of the article, it is useful to take a look at the definitions some workshop participants gave for artificial intelligence (hereinafter AI). This helps to understand their views and also reveals that there are different definitions for AI already in a small workshop. Artificial intelligence, as defined by Tuomas Pöysti, is 'a series of different kinds of general purpose digital technologies modelling functioning and reasoning of human brains.' According to Anuradha Nayak, AI can be defined as 'a human artefact. Artificial yet so real. It replicates and represents an augmented version of intelligence and sentience, attributes that signify a human being. Simultaneously amalgamating itself with humans through digital

6 Contributors to this text were Beata Mäihäniemi, Hanne Hirvonen, Tuomas Pöysti, Dory Reiling, Burkhard Schafer, Anuradha Nayak, Laura Lassila and Leo Leppänen. Thanks for the comments to Riikka Koulu, Jenni Hakkarainen, Kalle Markkanen.

identities and the futuristic human-machine interface.'[7] Pöysti notes that although the capabilities of most AI programs are limited in terms of problem-solving abilities, intelligent machines and automated data processing will rapidly appear as collaborators for humans. Nayak points out the future holds promises for a General AI (GAI) that would represent a holistic intelligence that could in fact compete with human intelligence.

New AI applications are used in many different ways to ease operations. Concrete examples of everyday AI applications are e.g. big online platforms that predict very accurately what consumers are interested in purchasing or entertainment services which are able to give personal music or film recommendations for every user. From this point of view, it is good to remember that the need to find better tools is not new at all. As Pöysti pointed out in his presentation, human history is a history of developing and using tools. However, AI as a tool is quite a unique if compared to older tools. Pöysti stated that the partnership and collaboration with intelligent machines will be a powerful one. In the future, we will be assisted by intelligent virtual assistants and AI colleagues in our daily actions and professional life.

Behind the surface, different AI applications include several approaches and techniques. However, one common feature for most of them is the central role of data. As AI systems are trained on historical data, it is important to point out that software is also only as good as the data it is trained on. In real life this means different practical problems – for example Reiling reminds that predicting outcomes on the basis of past case law assumes this case law is correct (see closer

7 Anuradha Nayak, 'In a techno-political horizon: Autonomous AI and electronic personality', abstract for the Workshop 'TOWARDS AI-DRIVEN SOCIETY. A LEGAL PERSPECTIVE', 7th of June 2018, University of Helsinki, Finland.

part 3, example 1). As the AI definitions and the problems that are drawn through them reveal, the fact that AI is based on data is a key part of AI's social impact. However, it results in a number of problems such as different kinds of bias,[8] which requires the legal system to address this bias by ensuring the quality of data and the proper ways to use it. However, due to the space concerns, this article is not focusing on questions concerning e.g. biases or other kinds of challenges that come along with gathering and handling datasets. Instead, this article is focusing on matters such as how can we benefit from data to create and improve (legal) and other societal services as well as how to ensure that data is correct and properly protected.

The discussions from the workshop provide a basis for this article similarly as the above-mentioned definitions of AI. One of the major issues that AI raises in the legal sphere and that was repeatedly brought up at the workshop is the question of how AI could be regulated to best serve the society. This is because the attempts of technology companies to self regulate do not necessarily serve the society at large, as it will be pointed out below. The following part 2 is focusing on attempts to provide guidelines on improving the regulation of AI.

2 REGULATION AND POLICY OF AI

2.1 INTRODUCTION

In this chapter we will focus on some of the challenges that AI brings to regulation and policy. In particular, as to the regulation of AI, we will

8 See, e.g., Virginia Eubanks, Automating Inequality: how high-tech tools profile, police and punish the poor. St. Martin's Press 2018; Cathy O'Neil, Weapons of Math Destruction. Crown 2016.

tackle the question 'How existing laws should be tweaked to respond to the current challenges?' as well as 'Should new laws be created to regulate AI?'. As to the policy changes inspired by AI, we point out that the increased use of AI, e.g. autonomous cars (which of course are only one example concerning the relationship of AI and regulation), can also affect the interactions between citizens and law enforcement. In particular, policing traffic in smart environments will be given as an example.

2.2 REGULATION OF AI

The question on the regulation of AI comes into motion where a number of technology companies use a strategy where they claim that the law in force is not suitable for the new technology. Therefore, they postulate resorting to self-regulation or start lengthy debates on new legislation. Therefore, these tech companies wish to strategically avoid more restrictive regulation. Nevertheless, as the laws in force are just as valid as before, the important question is how to interpret the laws to accommodate the already existing law.[9] One of the issues with this accommodation is that, as pointed out by Pöysti and evaluated later on this article, natural and legal persons are regulated directly or indirectly through the market, however, the regulation should always be based on a human actor (the so-called idea of anthropocentric law[10]).

9 See Riikka Koulu – Beata Mäihäniemi – Vesa Kyyrönen – Jenni Hakkarainen – Kalle Markkanen, Algoritmi päätöksentekijänä? Tekoälyn hyödyntämisen mahdollisuudet ja haasteet kansallisessa sääntely-ympäristössä (Algorithm as a decision maker? Possibilities and challenges in using AI in national legislative environment). Valtioneuvoston kanslia 2019.

10 On definition and history of anthropocentric law, see e.g. Jan G. Laitos - Lauren Joseph Wolongevicz, Why environmental laws fail. William and Mary Environmental Law and Policy Review, 39(1) 2014, pp. 1-52, p. 6-11.

As a first answer to the question of 'How existing laws should be tweaked to respond to the current challenges?', according to Pöysti, law should regulate the relationship between the human and AI. This is so as traditionally the law has regulated human to human relations or legal artefacts created by humans (like foundations and trusts). Today and in the near future law might also have to regulate the relationships between humans, intelligent machines and networks. This is very visible in the European Union data protection law where the General Data Protection Regulation (EU) 679/2016 (hereinafter the GDPR)[11] Article 22 contains a general principle of the right of humans being ultimately evaluated by humans. In addition, the preamble of the GDPR paragraph 4 states the general principle underlying data protection laws, according to which processing of personal data, like other actions based on AI, should be designed to serve mankind. However, the discussion during the workshop offered also an alternative way of the interpretation of the relationship regulated by GDPR, which could be defined more narrowly as the systems' users competence to make use of the predicting skills of the system.

According to Pöysti, the fundamental role of law in digitalised society is to maintain human dignity and integrity. The GDPR and data protection regulation in general have an important mission in governing the relationship between humans and AI-powered

11 Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

machines.[12] Data protection regulation is important because it goes to the source of many AI-based applications: the users' data that contributes to the improvement and development of the applications and improves automated decision-making. Moreover, Pöysti pointed out that the importance of the relationship between humans and AI-powered machines makes both paragraph 4 and article 22 of the GDPR eventually one of the most important pieces of regulation regarding information processing and automated decision-making.

Pöysti also stated that data protection regulation helps to answer some of the fundamental questions of our time: the systemic risks related to automated decision-making and living together with (semi) intelligent applications and devices. Also, data protection regulation requires quality of information processing, sufficient security and structural protections of legal rights to be built into the platforms and software systems. The idea of data protection by design and default is a general principle and core requirement in the GDPR Article 25 as well as information security in Article 32 of the GDPR.

It is yet important to remember that as the GDPR is quite new regulation there is lots of conversation regarding it and many times it is the first aspect that comes to mind when discussing about AI related legal questions. This strong GDPR approach is partly problematic as it may marginalize other essential legal instruments.[13] During the workshop, the participants also pointed out that there are many other governance mechanisms such as the International Human Rights Framework or competition law.

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12 Lawrence Lessig, Code: and other laws of cyberspace. Basic Books cop. 1999; Lawrence Lessig, The future of ideas : the fate of the commons in a connected world. Vintage Books cop. 2002; See also Tuomas Pöysti, Kohti digitaalisen ajan hallinto-oikeutta. Lakimies 7-8/2018, p. 868–903.

13 See eg. Pöysti 2018, p. 879.

However, the existing laws may still be insufficient to accommodate the changes brought along by AI. For example, according to Pöysti, data protection regulation alone will not be sufficient on the AI governance task. Therefore, a more general way to establish principles of human centric digital technologies and legal humanism are needed. As pointed out earlier, in his workshop presentation, Pöysti stressed the problem of regulation of AI developing away from human-centered regulation, and that would be considered a wrong way of development. Therefore, he postulates the need for human-centric principles that would be based on the rule of law and securing the efficiency and effectiveness of fundamental and human rights in digital environment. The task is to write the fundamental principles of fundamental rights into the infrastructure, digital architectures and to the code and algorithms of the AI powered systems. Workshop organisers found this recommendation extremely important, however, they were not sure who would in fact be precisely responsible for formulating these principles. For example, would they be the programmers and companies themselves? What is more, there is a question of how would the task of writing principles into vertical infrastructures work out in practice, at which stage would it be done and finally, who (perhaps a separate governmental body?) would ensure that (1) the rules are indeed written in or (2) there is compliance with these principles?

According to Pöysti, there should be general legal requirements for preserving the principle of human rights by design, such as default and proper system testing and maintenance, access to a sufficient quality of data, realisation of citizens' rights of access to data, analytical tools and access to good digital administration and justice. The ensuring rights by design and default should not be limited to just data protection

regulation.[14] Instead, the question is to code in a reasonable general balance of all of the fundamental rights and freedoms.

Therefore, as pointed out by Pöysti, we need to establish principles of human-centric digital technologies. Moreover, in dealing with AI, we should focus on legal humanism that is based on rule of law as well as on securing the efficiency and effectiveness of fundamental rights in digital environment. Here, data protection law alone will not be sufficient on this governance task.

However, he points out that this could succeed only where two methodical remarks are fully taken into consideration. Firstly, law should be proactive, and law is a mechanism of societal and corporate planning. Secondly, law can be effective while dealing with AI only if it is context-sensitive by taking seriously the specific empirical realities of each working environment, which requires a multidisciplinary approach for lawyers to work together with computer scientists and other professionals. Legal work and legal method in the digital environment require systemic and systematic risk management, which increasingly concurs with a general theory and practice of risk management developed in various aspects of computing, management and administrative sciences.

Moreover, as the second answer to the question 'How existing laws should be tweaked to respond to the current challenges?', it is important to point out that the introduction of AI-based technology may also lead to significant revolution in policy. For example, as Schafer pointed out, introduction of cars has been a major industrial breakthrough that also caused a revolution in policing. While car ownership would soon become commonplace, the traffic environment remains for many citizens the only time where they interact with frontline police officers.

14 See eg. Pöysti 2018, p. 879.

The speed and range that the car also gave to criminals required new forms of cross-border cooperation between police forces, both nationally and internationally. Finally, the emergence of a new legal regime, "road traffic law", also gave the police in many countries significant new surveillance powers: it remains almost impossible to drive without violating some regulation and "pretextual searches" for minor traffic law violations became in many jurisdictions a strategy for gathering (legal) intelligence.

As pointed out by Schafer, the advent of autonomous and semi-autonomous vehicles on our roads could result in changes to policing and the interaction of citizens and law enforcement, which could denote us to the same regulatory environment that existed before cars. Some traffic offences might become irrelevant – if the car drives, its human cargo may well be drunk. Other traffic offences might become impossible to commit – the car's AI will have a status report of all its constituent parts and can remotely ascertain and proof that the insurance has been paid, the tires are inflated, the lights are working, and the license plate is not obstructed etc. With this in mind, an important form of citizen-police interaction could disappear, and with that also a source of intelligence for policing.

Similarly, Schafer pointed out that due to the interconnected nature of fleets of autonomous cars and their constant interaction with their smart environment, massive amounts of information are created. This can be information not only about cars' physical space, but also about their legal status such as whether they are stolen, deemed not roadworthy etc. The information could also include knowledge of the number of passengers, possibly their age and other details. Finally, as autonomous and semi-autonomous cars have to be aware of their environment, they will also record (what remains of) the interactions

between police officers and drivers, creating a more seamless net of "sousveillance", the surveillance of state actors by citizens. Similarly, the police could routinely create data about its own operations when policing smart cities, allowing much faster, and more accurate detection of problematic patterns (e.g. disproportionate use of surveillance and other investigatory powers, such as unlawful data access requests against drivers of ethnic minorities). During the workshop discussion it was pointed out that such predictive policing is actually already used to some extent globally.

According to Schafer, this kind of predictive policing could result in less confrontational (as carried out remotely) and less biased policing. It could however also mean an increase of "defensive policing", where everything is demonstrably done by the book (which is only good if the book is good) and a loss of discretionary judgement, in the knowledge that every police-citizen interaction is recorded via multiple channels.

Taken together, all this points to the need for a considerable readjustment of the legal environment within which traffic policing takes place. As the UK and also the Nordic countries identify smart cities as a major component for a sustainable urban environment, with initiatives such as Smart City Sweden, the Nordic Smart Cities Conferences, or Future Cities Glasgow, hard questions have to be asked about the future of traffic policing and traffic law in intelligent environments. This means not just a re-evaluation of surveillance powers, but also issues such as police oversight and complaints procedures, which at the moment are not ready to deal with massive amounts of digital evidence that could in the future be supplied by citizens (or rather, the AIs in their cars) as a matter of course.

To sum up, the issue of tweaking existing laws to respond to the current challenges, has, during the workshop pointed out two

important issues. As stressed by Pöysti, there is a need for human-centric law, still, even in the rising age of AI and the need for preserving human dignity and integrity. What is more, as pointed out by Schafer on the example of autonomous cars, introduction of AI-based technology may lead to significant revolution in policy and some legal adjustments in that sphere would be required. However, other researchers also focus on the challenges created by developing new laws that would go beyond the limit of anthropocentric law. This is analysed in the further part of this article.

2.2.2 SHOULD NEW LAWS BE CREATED TO REGULATE AI?

The question of whether new laws should be created to regulate AI, has been mostly pondered upon during the workshop by Nayak. She denotes that ''bringing AI robots under the legal identification of personality, (...) should be developed as opposed to the traditional legal regulation of solely human relationships.' Granting 'electronic personality' to autonomous and adaptive robots has been in fact, in 2017, agreed by the EU Parliament's Committee on Legal Affairs (JURI) as a guideline for the future. Therefore, the legal framework for 'AI (Artificial Intelligence) and Robotics' focuses on their development, use, ethics and electronic personality. In particular, it evaluates on: (a) creation of ethical guidelines to robots; (b) liability rules applicable to robots; © 'Electronic personality' to autonomous and adaptive robots; (d) Independent interaction with third parties.[15] Nevertheless, although this is only a draft of the legal framework,

15 European Parliament Report (2015/2103(INL)) of 21 Jan 2017 with recommendation to the Commission on Civil Law Rules on Robotics <http://www.europarl.europa.eu/doceo/document/A-8-2017-0005_EN.html> accessed on 18 Mar 2019.

the EU Parliament insisted the European Commission to follow suit. Futuristic experts, legal manufacturers and lawmakers approved this stance. Conservationists were reluctant and wrote an open letter urging the EU Parliament to restrain itself from bringing AI robots under the legal identification of personality. They stressed that JURI had over-evaluated AI and robotics. The report, although focused on technological impacts of AI and robotics, has unforeseen psychological, ethical and societal repercussions.[16] Moreover, in 2018, the European Commission published its future strategy on AI, but refrained itself from the 'electronic personality' issue.[17] The above-mentioned political developments show that legal personality has become a sensitive issue.

AI simultaneously amalgamates itself with humans through digital identities and the futuristic human-machine interface. With these dynamics in play, AI locates itself in a techno-political horizon, a fusion of technological, legal and political boundaries that warrants the reinterpretation of the notion of personality. This will constitute an evolution to the present situation where the application of AI is 'specific' or 'narrow' focusing on performance of specific tasks. The future holds promise for a General AI (GAI) that represents a holistic intelligence competing with human intelligence, with prospectus of such intelligence merging with human intelligence.

This raises the following questions. How do technological advances affect the position of AI in the juridico-political sphere? What does

16 Open letter to the European Commission Artificial Intelligence and Robotics (Robotics-openletter.eu 2018) <http://www.robotics-openletter.eu/> accessed 18 Mar 2019.

17 Thomas Burri, The EU is right to refuse legal personality for Artificial Intelligence (EURACTIV 31 May 2018). <https://www.euractiv.com/section/digital/opinion/the-eu-is-right-to-refuse-legal-personality-for-artificial-intelligence/ >, accessed 18 Mar 2019.

'personality' mean in this space? Why is the existing concept of personality not inclusive? In that reference, what measures could be taken to formulate a customized notion of personality for AI?

To sum up, as noted during the workshop discussions, the development of an AI-based society requires changes to the law but also changes to policy. This is because the definition of AI, its form and tasks are constantly evolving. We are slowly moving away from the narrow AI towards a notion of electronic personality. What is more, changes to regulation bring along the need to update the policy. In the following chapter, we will introduce some examples of AI-based applications and show how they challenge the application of law.

3 LEGAL QUESTIONS RELATED TO THE APPLICATION OF TOOLS THAT ALLOW MORE EFFICIENT WORK

In this part, three examples on legal questions related to the application of tools that allow lawyers to work more efficiently are introduced. All three examples were given during the workshop and were complementary as every one of them describes some legal questions related to the application of AI tools that allow more efficient work. According to these examples, researchers in different fields of law meet legal challenges when AI tools come to the picture. It is interesting that even though the presentations in the workshop were very compact and the given examples were from different fields of law, it is still possible to identify the same kind of themes from every example. These examples may help to define some shared research questions and focus points for the legal perspective of the AI-driven society.

3.1 EXAMPLE 1: AI IN COURTS

First of the examples is about the use of AI in courts and it was given during the workshop by Dr Dory Reiling. This theme has been discussed in many conversations but often in a bit exaggerated format. Questions like "will there be robot judges" are of course interesting, but not necessarily very close to the real life current situation where courts actually are or what courts even seek. However, the digitalization of courts is a very concrete example of the progress where AI changes legal precedent.[18]

In her presentation, Reiling stated that in order to understand what AI can do for courts, it is useful to distinguish the different processes in judging. Many cases are mainly routine. If the information that comes in is sufficient to determine the outcome, no information exchange between the parties is needed.[19] Since in these cases all the court does is provide a title for execution, AI may be useful to triage incoming cases into this group. A lot of family and labor law related cases are also largely routine, since they are brought to court in cooperation between the parties. The court's role in these situations is largely notarial. Here, predicting outcomes in order to provide advice to the parties could help speeding the cases through court.

Reiling also stated that when the information brought to the court is not enough to predict the outcome, things change. In more complex cases unpredictable outcomes always impose risks for parties. Here, according to Reiling, court procedures are a conversation about what

18 Riikka Koulu, Digitalisaatio ja algoritmit – oikeustiede hukassa? Lakimies 7–8/2018, p. 840–867, p.846.

19 On different roles on the basis of which court cases can be categorized according to the use of information in each group see Reiling 2009, in particular pages 116–117.

happened (facts) and what the facts meant legally (significance). This conversation is also a way to reduce the complexity of the dispute. Parties may agree on some points, but not on others. Sometimes, parties still settle their dispute with an agreement. In this case, a prediction as advisory can also be helpful for the parties to decide how they need to settle their differences and reduce the risk of unpredictability. If not, a judicial decision is needed to end the case. In this case, by no means the largest proportion of court cases, judges may be helped with algorithms structuring the information in the case file, predicting outcomes as advisory and testing the fairness of the judge's conclusions.

Reiling also reminded us not to be over optimistic or overestimate the help and usefulness of these AI tools. She pointed out that predicting outcomes on the basis of past case law assumes this case law is correct. It is not easy to check the correctness of earlier case law if compared to different types of data, for example more statistical information. This is one reason why predicting from earlier court decisions differs from more simple situations where the right answer can be easily deduced straight from the facts. Generally, law is a complicated system and it seems that ideas concerning "robot judges" are based on over-simplified impression of courts' work and also overrated assessment of AI applications' usefulness and objectivity.

Another important thing Reiling pointed out is that AI does not use legal reasoning in its methodology. Legal reasoning deals with what happened, procedural fairness, legal framework and moral considerations. Its structure largely looks like this: facts, circumstances, rules, analysis, and outcome. Article 6 of the European Convention on Human Rights requires that courts provide a fair procedure. This includes accountability, an explanation of the outcome of cases. This

kind of explanation, the kind we ask of humans, AI cannot provide. It is crucial to keep in mind that AI works with existing inputs. This assumes that input is correct, and can be processed by the AI.

'What does it take to make AI useful for courts?', Reiling then asked. According to her, the legal source input needs to be improved. It then requires, among others, the implementation of European Case Law Identifier that would be available not only for court cases, but also for other legal sources like legislation and parliamentary documents. Reiling saw that AI can do for courts things that do not get a lot of attention in the hype around predicting outcomes, but can still be useful: structuring large amounts of information, for instance in big case files, analyzing processes to detect bottlenecks in case management and increase efficiency and testing case outcomes for equality. Hopefully these new working methods will soon be in use and we will get to a point where judges can focus on the most important parts of their job.

Finally, as pointed out by Reiling**,** we need to trigger a warning that digital support of judicial decisions might not help the most vulnerable (in courts). Financial efficiency should not be the only goal of changes and there should also be some ethical considerations included. Therefore, some guidelines for the use of AI by courts should be provided. In fact, the Council of Europe's Commission for the Efficiency of Justice has, in December 2018, produced guidelines for the ethical use of AI in courts. These are, firstly, respecting fundamental rights which denotes ensuring that the design and implementation of artificial intelligence tools and services are compatible with fundamental rights. Secondly, non-discrimination that is preventing the development or intensification of any discrimination between individuals or groups of individuals. Thirdly, ensuring quality and security: with regard to the

processing of judicial decisions and data, using certified sources and intangible data with models conceived in a multi-disciplinary manner and in a secure technological environment. Fourthly, ensuring the transparency, impartiality and fairness in making data processing methods accessible and understandable as well as authorizing external audits. Finally, ensuring that processes are "under user control" that is precluding a prescriptive approach and ensuring that users are informed actors and in control of their choices.[20]

The workshop aimed to understand AI related issues that are currently being considered by researchers of different fields of law. This example describes well both practical and theoretical sides of the question in court – for example better case management is a practical benefit AI tools may offer and the possibility to use AI in legal reasoning is an example of matters that demand more theoretical thinking. When AI tools' use in court raises questions concerning due process and fundamental rights, the following example on automated journalism represents completely different research orientation. Following example moved the conversation from procedural law to private law and more closely to copyright law.

3.2 EXAMPLE 2: AUTOMATED JOURNALISM

Second example is about automated journalism and this example was given by Mr. Leo Leppänen. According to **Leppänen,** recent years have seen an increase in the use of automation in the news organizations

20 European Commission for the Efficiency of Justice (CEPEJ), European ethical Charter on the use of Artificial Intelligence in judicial systems and their environment. Strasbourg 3-4 December 2018. Available at https://rm.coe.int/ethical-charter-en-for-publication-4-december-2018/16808f699c.

around the world. This increase in automation is perhaps most visible to the audiences and the general public in the shape of automated generation of news articles.

Leppänen explained that financial efficiency is one of the most important drives of the change. The reasons for the employment of such automation technology are myriad, but largely boil down to a need to achieve more with less resources. For example, in cases where automation can reduce the cost of producing an individual piece of news content towards zero, it becomes feasible to target the so called "long" tail, where consumer preferences are divided among a great number of different categories. Normally, the marginal costs for investing resources into creating niche content would be too high. However, in the case of automation, hundreds or thousands of articles could be produced cheaply, each targeting a highly specific audience of a handful of readers. At the same time, automation could allow the redirection of the human journalists' effort to where it most counts: from producing the bulk news reports to analytical and introspective journalism.

Every time something is automated – the same problem occurs – how to define the rights and responsibilities of the party that is "in charge". According to Leppänen, in this context the question concerns both the rights and responsibilities of the author. Due to the limited time Leppänen wasn't able to describe in detail what kind of responsibilities are the most relevant ones in this context. However, according to Leppänen, legal questions become increasingly pressing as the systems move from relatively trivial and "safe" domains, such as weather reports, to others with increasing complexity and societal and financial importance such as finance and elections.

Leppänen pointed out that the systems used to generate news articles are complex and the production of even the simplest system can directly or indirectly involve dozens of people. This probably is obvious to people who are familiar with computer science, however, not necessarily to all others. As this example shows, in order to understand the AI-driven society an interdisciplinary collaboration in needed.

It is therefore unclear, whose name should be on the byline of the produced news articles, as pointed out by Leppänen. Attributing it to the software itself hides the humans not only from the glory, but also from the responsibility over the system's possible failures. This suggests that we should hold those who had a part in the creation of the system as authors. But there again lies problems: to what degree can we hold the author of a 3rd party software library, who has probably never even heard of the specific system, an author of the system's output? Does the answer depend on the significance of the library for the system as a whole? If the system uses machine learning and ingests hundreds of thousands of news articles written by humans in order to learn how to mimic them, what is the contribution of those original authors? Or that of the journalists who tell the engineers what to do?

Leppänen's example describes well some of the legal questions which the technological development has caused. Leppänen was focusing on the work of journalists, but in the same way in a judicial context automation and new technologies may help lawyers or judges to focus on the more difficult tasks. Situations similar to this example can be found among others while applying automated decision-making to the public sector. In these cases, there is also a need to define the person who takes the responsibility of a certain decision. More generally, this example shows in a simple way what kind of problems

current anthropocentric law causes in these new circumstances where the human actorship is not self-evident basis anymore.

As the example shows, typical working methods have changed in two ways: 1) people do less by themselves while the role of machines is growing and 2) roles in certain production and collaboration have become more complex. Many times, the legislation is based on the idea of rights and responsibilities of one actor, which is one of the reasons for the new interpretation problems. This presentation also of course raises new questions. As AI can produce news "independently", but it can also have more of an assisting role, it would be interesting to discuss i.e. how this affects the question of different responsibilities. It is also important to notice that it seems that working methods in the future are not "either human or machine" type but "both human and machine" type. Even though AI applications are developing and becoming more and more autonomous, the workshop's examples show that most relevant focus point is the relationship and co-operation between humans and AI-powered machines. This remark strengthens points that were made already in the second chapter of this article.

The last example of this article is about smart contracts and it offers third point of view to the legal issues AI related tools bring up. As the example comes from contract law, where the freedom of contract is a strong principle, it offers very different angle to the matter compared to the examples presented so far.

3.3 EXAMPLE 3: SMART CONTRACTS

The third example, which was presented by Ms. Laura Lassila in the workshop, is about interpreting smart contracts. Smart contracts generally refer to a digital programme based on blockchain technology

which performs its inner logic. As the code cannot be changed, smart contracts are both self-executing and self-enforcing. This is a significant difference compared to conventional contracts established through speech, written words, or actions. Smart contracts can be applied in a multitude of different ways, with highly varying goals and circumstances.[21] Smart contracts are claimed to save contracting parties money, as they should be faster, cheaper and more secure than tradiional systems.[22] However, this new contracting method is not fully trouble-free from a legal point of view.

Legally interesting smart contract models can be divided into two different groups, as Lassila had done in her presentation. The first smart contract model here is called a "simple smart contract" and it refers to a contract where parties have agreed terms beforehand, either with different contract or within the code. Such terms constitute the smart contract, which then can execute itself as programmed. From these kinds of contract terms, one can in many cases find the key legal elements of a legally valid contract: offer, acceptance and intention to be bound by the terms. However, parties may be unidentified persons or machines, and this brings up the question of a legal subject.[23]

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21 See eg. Juri Mattila and Timo Seppälä, Älykäs sopimus - Miten blockchain muuttaa sopimuskäytäntöjä? ETLA reports 2016, available at <https://www.etla.fi/julkaisut/alykas-sopimus-miten-blockchain-muuttaa-sopimuskaytantoja/> accessed 19 March 2019.

22 The sources that praise smart contracts are not academic but they give good picture from the hype around the theme: Ameer Rosic, Smart Contracts: The Blockchain Technology That Will Replace Lawyers. Blockgeeks 2016. Available at: https://blockgeeks.com/guides/smart-contracts/ and What Are Smart Contracts? Guide For Beginners. Cointelegraph, available at: https://cointelegraph.com/ethereum-for-beginners/what-are-smart-contracts-guide-for-beginners#what-are-smart-contracts-for. Accessed 20.4.2019.

23 Riikka Koulu, Blockchains and Online Dispute Resolution: Smart Contracts as an Alternative to Enforcement. SCRIPTed – A journal of Law, Technology & Society, 13(1) 2016, p.40-69.

220 Another type of a smart contract model is an "intelligent contract", which in turn refers to a contract where AI is used for solving issues of reliability and usability of contracts. According to Lassila, AI can for example verify the code so that there are no bugs. AI can also be used to check the contract terms and that those terms are in line with agreed framework rules or legislation.[24] Smart contracts with AI have been called intelligent contracts in order to highlight the difference between not so smart smart contracts and contracts with actual intelligence.

One of the interesting questions concerning interpretation of contract law and smart contracts is, according to Lassila, whether a contract is valid if the parties agree without knowing the terms of the contract. Lassila has studied this question via Convention on Contracts for the International Sale of Goods (CISG), which provides interpretation rules for sales contracts. CISG article 8 sets the parties' intention to be the starting point of interpretation. In article 9 there are rules concerning binding contract terms. The article states that 'parties are bound by any usage to which they have agreed and by any practices which they have established between themselves.' From this starting point Lassila set following questions: could AI be seen as the next practice in international trade? Should it then be seen as the usage parties have agreed part to their contract?

In the workshop, Lassila based her own introductory answer on the contract freedom. According to Lassila, contract law traditionally leaves a significant amount of freedom to parties, especially in commercial

24 Bill Li, Intelligent Contracts - the AI Solution for the issues of Security and Smart Contracts. Matrix AI Network, 5 May 2018, available at: <https://medium.com/@matrixainetwork/intelligent-contracts-the-ai-solution-for-the-issue-of-security-and-smart-contracts-a992d1368fd1> accessed 19 March 2019

agreements, to choose the terms and conditions of a contract. Therefore, parties should have the freedom to choose AI to negotiate terms on behalf of them.[25] In real life, there are multiple different terms of use that consumers agree on without reading or knowing the content precisely. Lassila asks, how does this then differ from the situation where parties agree to use algorithm to create specific terms? She also continued with another question; if the parties cannot read and understand the terms presented in a code, is there a serious problem in the light of contract law?

According to Lassila, existing rules can give us tools to interpret contract clauses in new environment. General principles can function as a framework when finding ways to adopt existing norms to solve new legal issues. For example, the principle of freedom of contract gives contracting parties a possibility to choose ways and methods to make agreements. What is more, these principles could be used as a framework in AI driven contracts when parties agree to be bound by the principles. Here, AI, or better say, code, could solve questions of specific terms, answering the problem of how to reach the parties' intention.

In the beginning of this article we mentioned that many of the issues regarding AI-driven society are so new that the current laws can't often be bent for to be applied to new situations. Our human-centric law, which mostly regulates human to human relations, seemed problematic also according to the previous example. However, Lassila's presentation allows us to rethink this matter and it seems that this is not always the case. With innovative interpretation one might find possibilities to interpret law in a way which is coherent, logical and

25 Of course there are several contract types where parties don't have full contract freedom and they have to take different kind of regulations into account.

does not change the original meaning of the text to a great extent. It is also important to notice that where the legal text itself is not applicable to the case, the general principles of the field may also be of help. This shows us that one should not make too fast conclusions when facing new kind of relationships between humans, intelligent machines and networks and just rush to demand new legislation. It is often very easy to state that existing laws cannot solve certain new problem, but this is not necessary always the case.

4 CONCLUSIONS

The workshop organised by the Legal Tech Lab ended up with fruitful discussions on a range of topics related to AI. In particular, we seemed to provide an overview of the crucial questions that legal research can ask on artificial intelligence, such as the need to tweak the existing laws and the possibility of creating new ones. However, the discussions also provided some particular examples of the areas where legal problems connected with the regulation of AI can arise, such as the use of AI in courts, automated journalism and smart contracts. We have noted that most of the speakers agree on strengthening the role of a human actor wherever the question of the regulation of an AI occurs.

Below we sum up some of the observations from the discussions. As to the regulation of AI, several recommendations were offered such as the need to write the fundamental principles of fundamental rights into the infrastructure and digital architectures and, to the code and algorithms of AI powered systems. What is more, a more general way to establish principles of human centric digital technologies and legal humanism would be welcomed. These principles should be based on the rule of law and securing of the efficiency and effectiveness

of fundamental and human rights in digital environment. Moreover, according to Nayak, in order to embrace electronic personality and develop this legal concept, some kind of consensus has to be met in techno-political horizon, which for now is a fusion of technological, legal and political boundaries that warrants the reinterpretation of the notion of personality.

As to the policing of AI in the era of the rise of autonomous cars, Schafer calls for a considerable readjustment of the legal environment within which traffic policing takes place. This is because the advent of autonomous and semi-autonomous vehicles on our roads could result in changes to policing and the interaction of citizens and law enforcement that is every bit as profound as that of the early 20th century, and, somewhat counterintuitively, puts us back to the word before cars.

The workshop also evaluated on AI related tools that allow more efficient work are very different from the tools people have used earlier. They allow replacing many tasks via automation and transforming working methods, however these changes can raise legal questions that current legislation cannot necessarily address. This has been illustrated in this article on the examples concerning automated journalism and smart contracts.

Another important point deriving from the examples related to AI tools that were introduced in this paper, is that efficiency should not be the only driver of the change. In order to benefit from these new AI tools, it is also important to recognize the possible problems. One of them was pointed out by Dory Reiling, when she pointed out that where AI works with existing inputs, an assumption that an input is correct, and can be processed by the AI, does not always hold. For this

reason, for example predicting outcomes on the basis of past case law is a complex matter as the past case law is not always correct.

To sum up, the workshop provided and stressed some specific guidelines for the regulation of AI, both at the general level as well as in specific areas. Based on the discussion, it became self-evident that regulation is always related to a particular context it is applied in.