Chapter One

Introduction: Technology and Law

Start with Why.

It is Tuesday, 6:30 am. Ella has just opened her eyes, realising that in less than 60 minutes, she needs to leave her apartment and get to her office. By 7:15 am, she is on her bike, and despite the rain and wind, she arrives at the office in twenty minutes. She quickly grabs another coffee, and after a short pleasant morning chat with her colleague, she starts reading her emails a bit before 8:00 am. The morning so far has been successful.

The email box is full of new emails. The calendar is colour-coded and already shows five reminders. Ella quickly peeks at the management tool that the law firm uses and checks her tasks, additional due dates, and whether a new client has been assigned to her. She also likes to review the work and the hours billed by junior associates to be kept in the loop, as she needs to sign them at the end of the week. After reviewing the calendar reminders, the emails, and the management tool, her game plan for today is clear.

First, she needs to review a multi-party contract and see the comments and changes the other party's lawyers have made. There are a few sections on liability and applicable jurisdiction that she needs to double-check with the existing regulations and practices. She might call a junior associate, Ida, to review those two sections and prepare suggestions. That should streamline the process. Before noon, Ella needs to send out the memo that she and Carl, a colleague from the tax department, prepared. They have analysed the most recent jurisprudence of the Court of Justice of the European Union regarding double taxation of corporate subsidiaries. They have used a new Natural Language Processing (NLP) tool, that the law firm purchased a month ago, which helped them to find the most relevant court decisions. However, Ella

and Carl still need to review them and prepare a draft for their client. Given that they need to send the memo before noon, they will work on the document simultaneously.

After lunch with her friend Rachel, Ella needs to draft a response to the appeal received three days ago. The client has lost the case, and wished to appeal against a decision rendered by an AI system called 'AI-Courts.' It is a new automation tool that aims to unburden the first instance courts. Firstly, she needs to petition the court to issue in-depth reasoning for the decision, as the AI-Courts commonly issue the decision with only 'concise reasoning'. The party needs to petition the court within the next five working days to obtain in-depth reasoning. In addition to this, Ella aims to request the underlying data and the AI-Courts' code. Ella's law firm has hired a team of software engineers that helps with the code review. Ella has been working on these cases for some time and enjoys the technical part. There is always something new.

Fifteen minutes before Ella needs to leave for her Krav-Maga class, the management tool pops up a new client that has just been assigned to her. It is a pro bono client, a small blockchain start-up that needs help with applying for a cryptocurrency trading license. The client has developed a solution that allows investors to support sustainable small and medium enterprises in selected countries in South America. The solution claims to check the financial backgrounds and secure the information about the entire supply chain through DLT technology while providing necessary funding through green bonds for chosen companies. Ella is immediately excited, as usual, when she is to work with novel technology and start-ups, but she does not want to be late for her class, as that would mean 50 additional burpees. So she quickly turns her computer off and is out of the door.

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As you can see, this is ***not a traditional introduction*** to a law book aimed primarily at an audience consisting of law students, attorneys, judges, governmental officials or in-house counsel, and anyone who would like to know more about law and technology.

The brief *Introduction* above depicts a lawyer's working day. Whether one works in a law firm, a courthouse, or a multinational corporation, many tasks will be similar. As we start this book together, I will be asking various questions as I would like you to engage with me in an imaginary discussion or an actual discussion in class or workshop. The questions I would like you to start thinking about are:

a) How many different technologies did Ella use?
b) Was she an active user or a passive one?
c) Would you describe Ella as tech-savvy?
d) What kind of knowledge did Ella need in order to work with these legal issues?
e) How did Ella learn about technology?
f) With whom and how did Ella work on her cases?
g) What kind of skills does Ella have in addition to the classical 'legal' skills that the majority of the legal students are trained when attending law schools?
h) Does Ella need to use any hardware other than a computer?
i) How many tools did Ella use?

As the book develops, we will touch upon all these questions and consider what this means for you and your work as lawyers. In addition, we will expand your technical knowledge, how you understand technology and innovation and how to approach developing your **tech skills**

Technology, particularly computers, has become intrinsic to our everyday lives and work. We cannot do much without access to phones, computers, or the Internet. Yet, even though we rely on these technologies, we rarely think about them and how they work. We fail to consider the effects of these technologies on our work, behaviour, communication, and critical thinking. **Thus, this book aims to help you understand various technologies and their underlying logic, while assessing the plausible benefits and risks.** This book also aims to help you acquire the necessary understanding how to work with diverse specialists, in case you need their expertise. The following sections of this Introduction introduce the areas and elements this book is built upon.

1.1. Understanding Technology

Let us start at the beginning – a **computer**. A computer is an electronic device that works with information. This information is often called data. A computer has the ability to store, retrieve, and process data. Humans have programmed and taught computers to do different things over time. These days, we can create documents, videos, play games, communicate, analyse and translate texts, or solve extremely challenging mathematical tasks in only a few seconds. Computers have advanced exponentially over the past decades. In 2018, OpenAI found

that computational power used to train the AI models has doubled every 3.4 months since 2012.[1]

Computers and human brains are similar but *different*. They are data processors, but their "operating systems" are original. They work differently; they have distinctive strengths, capabilities, and weaknesses. Even though this might sound bizarre, the most powerful computer known is *the* human brain. It is made up of about 100 billion neurons with roughly one quadrillion (one million billion) synapses – connecting brain cells. In the same way, we are developing more powerful computers and machines every day, we are still learning about the capabilities of our brains.[2]

Given that computers are processors, all the applied and used software needs to be built using logic that a computer can 'understand' aka process, whether it is Microsoft Office or more complex technology used in the finance, aviation, or energy sector. Thus, to understand the evolution of computers, their elements, capabilities, and limitations, we will dive into the history of computers. Simultaneously, we will investigate the logic computers apply in processing data and thus enter the waters of computational logic. Computational history and logic are addressed in **chapter two.** Afterwards, building on computational logic, we will move to understand computational thinking and the basis of what I call "computational law" in **chapter three**. In a world that relies on computers every moment, and our activities are facilitated through online platforms and in digital environments, we need to understand how computers operate and how they affect our relationships. We need to understand the underlying logic of technology.

Let us consider the example of driving a car. Everyone who wishes to drive a car must obtain a license and get appropriate training. First, the trainers will provide some technical knowledge, for example, how a car works, its instruments, what is considered dangerous, etc. Afterwards, they will teach us how a car—the technological tool—works and how we drive it in the environment by learning the traffic rules and signs. This knowledge aims to help us understand how to behave in relation to other cars and traffic participants. Subsequently, we learn how to control the car physically. First, we will test drive in a parking lot and then move to the streets while still having the trainer sitting next to us, ready

1. *See* Karen Hao, 'The Computing Power Needed to Train AI IS Now Rising Seven Times Faster Than Ever Before' MIT Technology Review, November 11, 2019.
2. *See* eg. Suzana Herculano-Houzel, *The Human Advantage: A New Understanding of How Our Brain Became Remarkable* (MIT Press, 2016).

to intervene if necessary. The purpose of this training is to use the car safely. Safety on the roads is considered the minimum requirement. In addition, we can learn more about the car that we are driving.

We can learn what kind of car we drive, how powerful the car is, and whether it is gas or electric. This helps us use the car safely and determine whether we can overtake the car in front and how quickly the car can stop. Maybe we do not need to be able to disassemble the engine, but we should be able to change a tyre safely or pour water or antifreeze in the right place, which could be skills that come in handy. Naturally, the more knowledge and skills we acquire, the more control we have. The same logic applies to communication technology, online platforms, distributed ledgers, or natural language processing.

As lawyers, we cannot **just be users** of technology. In the Netflix documentary "The Social Dilemma", Edward Tufte famously stated, *"there are only two industries that call their customers 'users': illegal drugs and software."* As such, as lawyers, judges, and policy-makers, we need to be able to critically assess technology, its use, its limitations or its possible advantages or harms. The more people think critically about social media, AI, and other technologies, the better. Technology can reassign and redefine the rights and obligations of the parties and tip the scale of justice, law, and ethics, and thus we need to be extra cautious when and how we use it.

The most relevant and impactful technologies, such as artificial intelligence, machine learning, and blockchain, are shorthand for further leaps in development. The most recent technological advancements **form the part II** of this book. In this part, I focus on the essential technologies currently applied in legal practice. For example, we will learn about artificial intelligence, natural language processing, and how we can use data. At the same time, we will discuss the differences between machine learning and deep learning or between distributed ledger technology and blockchain. Moreover, we will address the possibilities and risks directly or indirectly connected to these technologies and their applications.

As stated above, computers are processors. However, they still do not possess the essential conceptual intelligence or perceptual capabilities that most humans take for granted. Thus, the path for the majority of human activities, at this moment, is a collaboration between humans and technology. Sometimes more human and sometimes more technology. However, by leveraging human skills and abilities in a novel way, innovation continues to advance. Increased use of automation is a multidiscipline trend currently taking place in the legal industry. Thus, a new

field, so-called "legal tech", has been brewing in recent years. The final **chapter** is dedicated to legal tech, what it represents, and how to use it to advance our effectiveness and improve our deliverables.

1.2. Underlying Logic: Computational Logic

Logic has its origins in Ancient Greece. Logic represents a general understanding of formal reasoning, and we utilise it every day, whether we realise it or not. ***"If this, then that"*** underlies all our actions. It can have a natural representation, *i.e.* if I drop a book from a table, it will fall to the ground. Alternatively, it can have a more intellectual presentation. For example, if I read this book, I will know more about digital technology.

Logic is a discipline that analyses methods and argument patterns and their elements, including syntax and semantics, further described in **chapter two**. Since its beginning, logic has developed into a field of its own. We continuously recognise that logic is an essential aspect of our thoughts. To be and become thinking human beings, we should understand how we think, process and analyse data, evaluate the data, and come to conclusions. In the same way, given that the future involves working with computers in diverse forms and formats, we should comprehend their *computational logic*.

Computational logic started to develop with Gottfried Wilhelm Leibniz and Isaac Newton and their binary number system (*see more in chapter two*). Leibniz is known for developing formal computational logic and philosophical techniques and designing and producing actual computational machines. After more than a century, George Boole continued Leibniz's work by deconstructing computational logic into its key elements and creating "algebra of logic" – *Boolean algebra.* We will briefly review the history of each technology to understand how and why novel technologies advanced. As Carl Sagan famously stated, *"You have to know the past to understand the present"*.[3]

Computational logic provides various methods and argument patterns that explain the work of computational science and its diverse applications. The use of computational logic around us is vast, including more classical fields such as automated deduction, automated reasoning, and artificial intelligence logic to more nuanced areas, such as

3. Carl Sagan was an American astronomer, cosmologist, astrophysicist and science communicator.

web reasoning or bioinformatics. Given that computational logic represents a stand alone field of research, this book introduces computational logic as a backbone for understanding computational law.

1.3. Computations Meet Law: Computational Law

Computational law goes back to the times of computational logic and the work of Gottfried Leibniz. We can use computational logic to deconstruct legal arguments, regulatory norms, and court decisions and to design novel schemes for variable scenarios with encoded norms and arguments. Computational law is based on computational logic, which delineates facts and regulations as sentences in formal logic and uses mechanical reasoning techniques to derive the consequences of the facts and laws.

Computational law is an area of legal informatics focusing on the automation of formerly manual processes.[4] In its broadest sense, computational law is the application of computational logic to legal activities, including legal reasoning, legal planning, regulatory analysis or compliance review, where computer systems can carry out specific tasks. Computational law aims to enable a higher degree of automation to achieve better usability of the legal system and more efficiency in various tasks involving legal reasoning. Computational law is defined by the variety of processes and tools it uses.

Computational law is a developing field of law, specialising in utilising computational methods and logic to legal activities. It has direct consequences for the legal profession by improving the quality and efficiency of legal services and possibly changing how the law is practised. More importantly, it can also bring legal tools closer to the clients, rendering certain activities simpler, automatised, and thus cheaper. As a field, it has disruptive potential for the legal industry. Computational law can re-design not only how the law is being practiced, but also how the law is being created. Therefore, when digital technologies are employed to analyse, apply, and interpret the law and data, it must be assured that the legal language can be processed, analysed and applied correctly.

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4. For more, *see* Nathaniel Love & Michael Genesereth, Computational Law (2005), available online at: https://dl-acm-org.ep.fjernadgang.kb.dk/doi/pdf/10.1145/1165485.1165517 accessed October 5, 2021.

1.4. Future: Applying Computational Law and Thinking Differently

Technology cannot solve all human issues, but it can help with some. Each process and technology has positive and negative effects, which need to be continuously reviewed and reflected upon. This reflection needs to be carried out by the policy-makers, lawyers, and academics in collaboration with computational scientists, anthropologists, economists and other industry specialists. But before we can have an informed discussion, we need to have a common understanding of the technology. Thus, lawyers need to understand the technology, its underlying logic, intent, and objectives. Furthermore, lawyers need to be able to be more collaborative and innovative. One way to achieve this is through legal design thinking, which focuses on agile development methodology to approach and design new solutions to various legal issues. We will discuss legal design thinking and several case studies in **chapter four**.

Lawyers should not, by definition, become computer scientists, even though some might. Lawyers should continue to advise, support, and decide (as judges or arbitrators) on issues directly or indirectly touching upon technology. However, the new path does not end there. The range of career options available to law graduates is expanding. Many recent law graduates have established legal tech start-ups, work as legal technologists, legal process improvement specialists, or legal project managers. Lawyers are becoming a part of diverse teams where they are expected to **collaborate** and think differently. They need to acquire additional skills, experience, and exposure compared to the lawyers of the past. They need new technological understanding and a lot more flexibility and creativity.

To foster more innovation in the legal industry, lawyers need to start thinking and applying the law differently. Law is a dynamic discipline that is constantly changing and adapting. This continues change is further fused with technology, which opens many new doors. As the legal tech market accelerates, lawyers will not just be passive users of technologies that someone else has built for them. They will become the designers and co-designers of legal tools. Lawyers will become part of the discussion on how and when technology is used, how it is designed, and what its limitations are. These are complex discussions that require expertise and the ability to understand and collaborate across diverse disciplines. Thus, **chapter ten** of this book focuses on addressing the challenge of a complex multidisciplinary future, which inclues communicating and

working with colleagues and professionals who do not hold a law degree or business degree but are specialists in policy, technology, or data.

1.5. The Design of this Book

Technology will continue to evolve, and even while I am writing this book, I am sure a new technology has emerged. However, this book aims to make sure that we all feel comfortable with technology, that we can understand the basics, and build on them. This book is a guide to navigate through the digital space. It is a start and a point of reference for the intersection of law and technology. This book's design and activities should support you in this endeavour and create an environment where you feel intrigued and wish to ask more questions, whether in a classroom or your living room.

This book offers additional *sources* and *references*, either in footnotes or at the end of each chapter. In some segments, a reference to videos or podcasts is given, which might not sustain the challenge of time. Yet, luckily if you know what you are looking for, you should be able to find it on the wide, wild web. At the end of each chapter, there are assignments and questions that are designed to encourage critical thinking and possibly nudge you to continue your inquiry. Some assignments will take five minutes, and some can take a week, depending on how deep you wish to go.

Moreover, chapters are sprinkled with a few boxes. First are **Example boxes** providing illustrations for abstract topics or specific computational exemplifications or examples to understand the problem without searching for it on the Internet. Second are the **Relevance boxes**. They might be my favourite as one of my favourite questions is why or why is something relevant in the discussed context. "Why questions" should also become your favourite questions to ask.

This book consists of ten chapters, divided into **three parts**. The first part—**From Computations to Computational Law**—provides the basis to understand computations, computational logic, thinking and the law. Computational logic and law serves as a backbone for understanding computational law technology and how to work with it. The second part—**Elements of Computational Law**—introduces individual technologies that represent the building blocks for computational law. We, however, start with the approach of problem-solving. Chapter four on Legal Design challenges our thinking process, which law students and lawyers tend to have. It offers new ways to approach legal, business, design or

everyday life problems. Once we embrace a different practice that fuels our imagination, we move to discuss the essential technologies individually. Then, after acquiring knowledge in technology, we move to see the bigger picture and address how we think and conceptualise it. The final third part—**legal tech**—focuses on applying computational law in the legal industry and reflecting on the most recent developments in legal tech. This chapter aims to support the navigation of innovations and creating strategies and adopting those that are most relevant and efficient for you or your organisation. Furthermore, this chapter addresses the future challenges for the legal profession.

Historical perspectives are embedded in each chapter, allowing us to see the technology in context, which might be one of the most critical perspectives we ought to develop. We need to be aware of the essential facts and moments in history that shaped the reality we live in today. I believe that to understand the future we need to first come to terms with the past. Therefore, this element is essential for all of the chapters. You may only be interested in a few chapters. Yet, the book has been designed to not only spark your interest in computational law or law and technology, but also for you to see the connections and the context. Do not forget that context is everything.

1.6. Goals of this book

There are **three goals** this book sets out to achieve. The **first one** is to bring technology closer to anyone who chooses to embrace it. Lawyers do not appreciate novelties or uncertainties. However, this book is built on the belief that technology does not need to be either. Technology and its concepts can be understood and subsequently applied without an additional degree in computational science. Even if we struggle with an automatic locker in a swimming pool now and then, we can still embrace document automation or central bank digital currencies if we try to understand how they "behave". With this realisation, we can move forward and build bridges between computational science and law and ultimately develop better technologies for humans. This book aims to prepare you to take on any legal work with technological components, even if you do not know precisely what the technology is or how to use it before you do. The world is changing too quickly to learn everything you need to know in school and at university. Knowing how to learn and how to approach new learning, in this context—the new technologies—is the fundamental skill you need to cultivate in order to thrive.

The second aim is to provide you with the necessary **vocabulary**. The majority of lawyers are used to working with other lawyers. We are not that often working with specialists from different fields. We work with lawyers, accountants, and business people and even then, it takes time to understand each other and the meanings behind the constructs. With technology, it can be even more challenging. Given the degree to which technology already affects our life, we lawyers need to work more and more with computer scientists, data specialists, blockchain architects, AI developers, and other tech experts and be in a position to collaborate with them. **We need to understand each other**. Lawyers need to understand the basic concepts and underlying logic of technology, and if we talk about more complex innovative technology, we need to understand its diverse elements. Otherwise, we will keep talking about one thing and the other party about another.

The third aim is to expand how we think and bring a little innovation and imagination to law. With some activities spread across this book, whether undertaken individually or in groups, you might start to think about the law entirely differently. Do not jump over them, but consider them. This book aims to be a standing invitation to everyone to join. So whether you are a high school student who wishes to study law, a second-year law student, a computational scientist who would like to know more about how lawyers think, or a senior partner in a law firm or a judge, WELCOME!

**** Other Relevant Readings***

Lawrence Lessig, *Code: Version 2.0* (Basic Books, 2nd ed., 2006);
Caitlin Moon, *Delta Model Lawyer: Lawyer Competencies for the Computational Age*, MIT Computational Law Report (2019);
Richard Susskind, Tomorrow's Lawyers: An Introduction to Your Future (OUP, 2017).