

Elevating Legal Informatics in the Digital Age

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Introduction

We are living in an increasingly digitalized society where we are connected to the internet constantly and where a large portion of our social and commercial interaction takes place. It is in this context that almost all human behavior is or can be reduced to data, where human-to-human interaction is being replaced by human-to-machine interaction, and where machines incorporating artificial intelligence (AI) are making the decisions that affect humans. The popular euphoria associated with AI has resulted in a mass hysteria concerning the advantages to society. However, there are also risks with this technology and it is imperative to take cognizance of the fact that technology is a double-edged sword.

The law has many functions within society. It provides a mechanism for resolving disputes once they occur, for ensuring predictability within society, for facilitating commercial activity, for reflecting ethical norms, and for protecting society from risks and vulnerabilities by means of both reactive and proactive regulation. In other words, the overarching function of the law is that of a mechanism for handling problems and disputes.¹ The increasing use of information technology incorporating elements of AI

¹ Peter Wahlgren, “Automatiserade juridiska beslut,” in *Juridisk metodlära*, eds. Maria Nääv and Mauro Zamboni (Lund: Studentlitteratur, 2018), 407.

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is resulting in societal challenges and potential risks and harms that have a multidisciplinary imprint. A logical consequence is to deliberate the extent to which the law is equipped to face these new problems.

Considering the function of the law as a problem-solver, this chapter investigates the suitability of the law for solving the complex problems arising from the use of AI. It begins by examining the technology. This focus on technology, more specifically AI, is done not with the aim of investigating AI as a phenomenon in itself but is rather an illustration of the power of technology. Two legal methods are then introduced. The first is the “traditional legal science method,” incorporating the legal dogmatic method, and the second that of legal informatics.² These two methods are contrasted in relation to the complex nature of problems with AI.

The main aim of this chapter is to illustrate that, considering the interdisciplinary nature of the problems arising in the digital society, a more interdisciplinary legal approach is required to tackle problems and protect society from the ensuing risks. Complex problems require complex solutions. This necessitates an interdisciplinary approach, including research within and the application of the law. The legal informatics approach facilitates this by being more receptive to influences from other disciplines. Therefore, legal informatics not only provides an enhanced response by the law to problems arising from digitalization. It also maneuvers the law to better be a part of interdisciplinary research and thereby be a part of societal solutions.

The Power of Data

A conception shared by many is that technology is advancing at a rapid pace. New technologies appear as fast as old ones disappear and the digital environment seems to be in a state of continual

² At this point, it is important to place this chapter in perspective. First, it is written through the lens of the Swedish legal context; however, it is likely to be relevant in relation to other legal contexts. In addition, while multiple legal methods do exist, it is submitted that the legal dogmatic method is by far that legal method that is most widely applied by scholars, taught to students and applied by practitioners and judges.

flux. It is within this context that certain buzzwords seem to pop up from nowhere, for example “data mining,” “big data,” “predictive analytics,” “profiling,” and, more recently, “deep learning,” “neural networks,” and “artificial intelligence” (AI). What constitutes AI as a concept is subjective and is best described as moving target. What AI is for one person may not necessarily be AI for another, what was considered AI, say, 15 years ago is nowadays considered commonplace, and even the question “what is intelligence?” can be contested and debated. It is most probably for the above reasons (and many more) that there is as yet no legal definition of AI.

In attempting to define AI, it is important to acknowledge its existence as an academic discipline:

“Artificial Intelligence,” or AI, is a cross-disciplinary approach to understanding, modelling, and creating intelligence of various forms. It is a critical branch of cognitive science, and its influence is increasingly being felt in other areas, including the humanities. AI applications are transforming the way we interact with each other and with our environment, and work in artificially modelling intelligence is offering new insights into the human mind and revealing new forms mentality can take.³

Within the realm of AI, models are used that explain various dimensions of human and animal cognition, where the focus can be on the engineering of smart machines and applications.⁴ AI research areas include knowledge representation, heuristic search, planning, expert systems, machine vision, machine learning, natural language processing, software agents, intelligent tutoring systems, and robotics.⁵ In further seeking a definition of AI, it can be described as “a cross-disciplinary approach to understand, modelling, and replicating intelligence and cognitive processes by invoking various computational, mathematical, logical,

³ In *The Cambridge Handbook of Artificial Intelligence*, eds. Keith Frankish and William M. Ramsay (Cambridge: Cambridge University Press, 2014), front matter.

⁴ Keith Frankish and William M. Ramsay, eds., “Introduction,” in *The Cambridge Handbook of Artificial Intelligence* (Cambridge: Cambridge University Press, 2014), 1.

⁵ Frankish and Ramsay, “Introduction,” 24–27.

mechanical and even biological principles and devices.”⁶ AI can therefore be described as the pursuit of providing machines with intelligent capabilities modeled on those of human beings.

Machine learning (ML) involves the use of algorithms that allow AI systems to learn and which has become more important as these systems have started to operate more autonomously and in increasingly complex and dynamic areas of application.⁷ An algorithm is “[a] process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer.”⁸ Algorithms are used to identify patterns in data, after which these patterns are transposed into rules that are then utilized in decision-making systems. Algorithms learn from historical data, after which this knowledge can then be applied to novel data or situations. The extent to which we, with the help of machine learning, are able to extract knowledge from data has also altered the manner in which we use data to base our decisions on. Here reference is made to the notion of data-driven practices and evidence-based practices, where the former is problematic not least from the ethical perspective.⁹

AI technologies are characterized by two attributes, namely, “autonomy,” being “the ability to perform tasks in in complex environments without guidance by a user” and “adaptivity,” being “[t]he ability to improve performance by learning from experience.”¹⁰ Machine learning, therefore, is an area of AI that has progressed rapidly of late, one concrete form of this application of technology being the development and use of predictive models.

Models allow us to generalize about our surroundings in order to gain valuable insights that can be used to predict events.¹¹

⁶ Frankish and Ramsay, “Introduction,” 1.

⁷ Frankish and Ramsay, “Introduction,” 26.

⁸ English Oxford Living Dictionaries, entry “Algorithm,” <https://en.oxforddictionaries.com/definition/algorithm>.

⁹ For a more in-depth discussion of data-driven practices and evidence-driven practices see Teresa Cerratto Pargman and Cormac McGrath in this volume.

¹⁰ “Elements of AI,” online course on artificial intelligence, <https://www.elementsofai.com>.

¹¹ Simon Winter and Per Johansson, “Digitalis filosofi: Människor, modeller och maskiner,” *SE:s Internetguide*, no. 13, version 1.0 (2009): 21–34.

While models generally have been used to gain insight into data within the natural sciences, they are increasingly being used in social contexts in order to assist with the making of decisions. For example, commercial actors steer their interaction with clients via models built into digital decision-making systems that potentially incorporate AI elements and that interact with clients/potential clients. This increases commercial effectivity and cuts costs but it also allows commercial actors to gain insight from the data about their clients/potential clients. In other words, by identifying “risky” human behavior, companies can make better commercial decisions by separating “desirables” from “undesirables.”¹² Models can also have a predictive aim:

A predictive model captures the relationships between predictor data and behaviour, and is the output from the predictive analytics process. Once a model has been created, it can be used to make new predictions about people (or other entities) whose behaviour is unknown.¹³

Consequently, data left behind by humans in the digital environment reveals lots about them, especially regarding their behavior and personalities. Knowledge is power, yet it is only a few who have the means to afford this power-enhancing technology.

Enter the cognitive sciences

The disciplines that study human cognitive behavior are continually gaining new insights into how human beings think and make decisions. It has been stated that “[w]e live in an age of psychology and behavioural economics—the behavioural sciences.”¹⁴ Knowledge concerning how people think, psychologically and

¹² In search of a definition of “risk” many alternatives exist. For example, the Society for Risk Analysis (SRA) defines it as “the potential for realization of unwanted, adverse consequences to human life, health, property, or the environment,” in Peter Wahlgren, *Legal Risk Analysis: A Proactive Legal Method* (Stockholm: Jure, 2013), 20.

¹³ Steven Finlay, *Predictive Analytics, Data Mining, and Big Data: Myths, Misconceptions and Methods* (Basingstoke: Palgrave Macmillan, 2014), 215.

¹⁴ Cass R. Sunstein, *The Ethics of Influence: Government in the Age of Behavioural Science* (Cambridge: Cambridge University Press, 2016), 1.

physiologically, can be incorporated into decision-making systems and be used also to manipulate behavior. This is not particularly difficult considering that human beings are creatures of habit, habit accounting for 45% of the choices humans make every day.¹⁵ From this vantage point, historical data becomes important as it provides a window into the future.

For example, behavioral economics and behavioral finance are areas where the cognitive ability of humans is studied. The former is an area of study that is attributed to Daniel Kahneman and Amos Tversky, who authored an article that referred to psychological cognitive techniques in order to explain deviations regarding the making of decisions in relation to classical economic theory, thereby explaining why investors behave the way they do.¹⁶ Behavioral finance is described as “a sub-field of behavioral economics and proposes psychology-based theories to explain stock market anomalies, such as severe rises or falls in stock price.”¹⁷ Kahneman, in his book *Thinking Fast and Slow*, also describes humans’ thought processes by distinguishing between two systems that drive human beings’ cognitive processes and, depending on how one wants to manipulate a person, one of these systems for thinking could be addressed.¹⁸ On the topic

¹⁵ David T. Neal, Wendy Wood, and Jeffrey M. Quinn, “Habits – A Repeat Performance,” *Current Directions in Psychological Science* 15, no. 4 (August, 2006): 198, <https://journals.sagepub.com/doi/full/10.1111/j.1467-8721.2006.00435.x>. See also Kelly Rae Chi, “Why Are Habits So Hard to Break?” Duke Today website, January 21, 2016, <https://today.duke.edu/2016/01/habits>.

¹⁶ Daniel Kahneman and Amos Tversky, “Prospect Theory: An Analysis of Decision under Risk,” *Econometrica* 47 (1979): 263–291.

¹⁷ “Behavioural Finance,” Investopedia website, last modified November 8, 2019, <https://www.investopedia.com/terms/b/behavioralfinance.asp>.

¹⁸ Daniel Kahneman, *Thinking Fast and Slow* (New York: Farrar Straus Giroux, 2011). For a description on dual-process theories, see Shelly Chaiken and Yaakov Trope, eds., “Preface,” in *Dual-Process Theories in Social Psychology* (New York: The Guilford Press, 1999), ix. Here, it is stated that “[d]ual-process models [...] all share the basic assumption that two qualitatively different modes of information processing operate in making judgements and decisions and in solving problems. In essence, the common distinction in dual-process models is between a fast, associative information-processing mode based on low-effort heuristics, and a slow,

of manipulation, Richard Thaler and Cass R. Sunstein also refer to the term “nudge,” which illustrates humans’ susceptibility to manipulation: “[a] nudge, as we will use the term, is any aspect of the choice architecture that alters people’s behaviour in a predictable way without forbidding any options or significantly changing their economic incentives.”¹⁹ Therefore, by understanding the cognitive methods humans use to make decisions, attempts can be made to alter these decision-making processes.

In summary, then, the data people leave behind in the digital environment, when mined by machine learning mechanisms, can reveal much about their emotional, physical, and physiological circumstances. This information, combined with knowledge from the cognitive sciences, in turn reveals two important notions: the first is that people are not especially rational and the second is that people are exposed to being manipulated. This, in turn, leads to a number of potential harms.

Harms Associated with Digital Technologies

The reliance merely on data to predetermine the interaction between humans may have negative repercussions. Data may be defective or tainted with bias, which in turn will result in the technology reflecting this same bias. In addition, any technology may reflect the bias of its developers, be this intentional or unintentional. Also, long-term harms from the use of technology may not be apparent in the short term. Another problem with decision-making systems based on machine learning is called “overfitting,” which occurs when a predictive model is faced with

rule-based information-processing mode based on high-effort systematic reasoning. Related dual-processing perspectives distinguish between controlled versus uncontrolled, conscious versus unconscious, and affective versus cognitive models of processing.” The first mode of information processing is the intuitive and automatic way of thinking, which is fast and instinctive. It occurs almost as a reflex and is associated with a gut reaction. The second is the reflective and rational way of thinking, which is deliberate, self-conscious and associated with conscious thought.

¹⁹ Richard Thaler and Cass R. Sunstein, *Nudge: Improving Decisions about Health, Wealth and Happiness* (New York: Penguin Books, 2008), 6.

a situation not found in the training data and must fit this new set of circumstances to a rule that does not quite fit the new set of circumstances.²⁰ Another harm referred to is that of “self-fulfilling prophecies.”²¹ The rationale is that, if a predictive model designates a person to be a credit risk due to a poor economic situation, no credit institution will dare give that person credit, an effect being that the person’s economic situation will more than likely deteriorate (most people requiring credit to make something of their lives). Those who operate the predictive model will argue that the predictive model was correct in that it predicted the deterioration of the person’s economic situation. But a question arises: was the person’s deteriorating economic situation predicted by the model or caused by it? In other words, predictive models can “[create] the situation they claim merely to predict.”²² Finally, a harm that arises with the use of predictive models is “what to do when the computer says ‘no!’.” In other words, having been on the receiving end of a negative and potentially incorrect decision taken by a predictive model, what can a person do to rectify the situation if they even are aware of this situation?

The main overarching risk with the use of the above represented technologies is the potential harm to human autonomy. In their contact with diverse decision-making systems daily, humans are constantly being served information, data, pictures, music, and other content that commercial entities think they will like, the aim being customer satisfaction. This results in humans seeing the world through the lenses provided by the operators of the technology, which ultimately affects human autonomy.²³

²⁰ Foster Provost and Tom Fawcett, *Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking* (Sebastopol, CA: O’Reilly Media, 2013), 111.

²¹ Danielle Keats Citron and Frank A. Pasquale, “The Scored Society: Due Process for Automated Predictions,” *Washington Law Review* 89 (2014): 18, <https://ssrn.com/abstract=2376209>.

²² Citron and Pasquale, “The Scored Society,” 18.

²³ For a more in-depth analysis of the potential harms associated with predictive modeling, see Stanley Greenstein, *Our Humanity Exposed: Predictive Modelling in a Legal Context*. Dissertation (Stockholm: Stockholm University, 2017), <http://su.diva-portal.org/smash/record.jsf?pid=diva2%3A1088890&cdswid=2661>.

The Traditional Legal Science Approach

The law is a mechanism for solving problems. In applying the law to societal problems, lawyers, judges, and legislators generally apply the “traditional legal science method” in order to determine the existing law.²⁴ This method incorporates a “legal dogmatic” approach. It is also described as an approach to legal problem-solving taught to law students, providing them with a number of tools for problem-solving, such as interpretive arguments, modalities of decision, and conflict-solving maxims.²⁵ It is important to concede that there is no single legal method that is universal, transcending all legal systems, and that, in fact, the contrary is true, namely that there are many diverse legal methods, each having a different point of emphasis.²⁶ However, here three aspects are noted: first, the use of a legal method other than the traditional legal science method is usually done as an “add-on” (i.e., an extension of the traditional legal science method); second, the study of alternative legal methods remains restricted to the academic realm; and, third, legal practitioners are more adept at applying the traditional legal science method than they are at describing it, and there is little unanimity surrounding a single definition. Therefore, the contention here is that the traditional legal science method dominates the Swedish legal realm.²⁷

Kleineman provides a comprehensive analysis of the traditional legal science method.²⁸ Its application can be explained as a

²⁴ This chapter relies on the broad generalization that most legal practitioners (scholars, practicing lawyers, and judges) in the Swedish context, confronted with a problem, will automatically apply the traditional legal science method in order to establish the law as it is.

²⁵ Torben Spaak, *Guidance and Constraint: The Action-Guiding Capacity of Theories of Legal Reasoning* (Uppsala: Iustus Förlag, 2007), 12, footnote 5.

²⁶ Maria Nääv and Mauro Zamboni, eds., “Sammanfattning,” in *Juridisk metodlära* (Lund: Studentlitteratur, 2018), 17–20.

²⁷ Minna Gräns, “Om hjälpvetenskapernas betydelse för rättstillämpning och rättsvetenskapen,” *Juridisk tidskrift*, no. 3 (2006–07): 791: “[i]n Sweden, most legal scientists formulate their problems from a traditional legal dogmatic perspective by using conventional legal dogmatic methods.” (Paraphrased loosely from the Swedish by the author.)

²⁸ Jan Kleineman, “Rättsdogmatisk metod,” in *Juridisk metodlära*, eds. Maria Nääv and Mauro Zamboni (Lund: Studentlitteratur, 2018), 21.

solution to a legal problem by means of the application of a legal rule, the point of departure being the principles for the use of the commonly accepted sources of law.²⁹ The goal is the establishment of the law independently of any other scientific discipline and without taking policy considerations or ethical considerations into account.³⁰ Therefore, in seeking the solution to a problem, the main sources of law are laws, preparatory works, legal precedent (case law), and legal dogmatic literature.³¹ When faced with a problem, the main goal is the application of the abovementioned sources of law in order to determine “the law as it is.”³² Of these sources of law, it is laws and case law from the formal judicial instances that hold the greatest formal authority, while legal dogmatic doctrine (the writings of specialists) carries weight to the extent that the argumentation it puts forward is persuasive.³³ This method aims at acquiring a “coherent picture of the law [...] presenting the law as a network of principles, rules, meta-rules, and exceptions, at different levels of abstraction, connected by support relations,” this achieved not only by means of description and logic but also by including evaluative or normative steps.³⁴ Consequently, it is necessary to have a solid knowledge of the law as well as of the general principles that are accessed by means of studying preparatory works, precedent, and literature.³⁵ The traditional legal science method is to a certain degree rigid, constraining a judge, the aim being predictability and equality before the law.³⁶

This article is in Swedish and its content has been roughly translated by the author.

²⁹ Kleineman, “Rättsdogmatisk metod,” 21.

³⁰ Minna Gräns, “Allmänt om användning av andra vetenskaper inom juridiken,” in *Juridisk metodlära*, eds. Maria Nääv and Mauro Zamboni (Lund: Studentlitteratur, 2018), 429.

³¹ Alexander Peczenik, “A Theory of Legal Doctrine,” *Ratio Juris* 14, no. 1 (March 2001): 78, <https://onlinelibrary.wiley.com/doi/epdf/10.1111/1467-9337.00173>.

³² Kleineman, “Rättsdogmatisk metod,” 26.

³³ Kleineman, “Rättsdogmatisk metod,” 28.

³⁴ Peczenik, “A Theory of Legal Doctrine,” 79.

³⁵ Kleineman, “Rättsdogmatisk metod,” 21.

³⁶ Spaak, *Guidance and Constraint*, 43.

An aspect of the legal dogmatic method concerns questions of interpretation, which involves the abstract task of identifying the legal rule that is relevant to a legal problem, to describe it as well as its relevance to that situation but also to explain how that legal rule should be applied to that legal problem.³⁷ Considering the formal authoritative weight assigned to law and case law, and the fact that any legal solution to a problem requires a basis from within the above central sources of law, Kleineman asserts that alternative academic methodologies, for example from within the social sciences, are regarded as alien.³⁸

Two concepts central to the notion of argumentation are “the law as it is” (*de lege lata*) and “the law as it should be” or “justified recommendations for the lawgiver” (*de lege ferenda*). In researching the law, both these concepts are used to produce coherent theories, from both the enacted law (statutes and judicial decisions) and evaluations thereof. However, it should be noted that research *de lege lata* has a greater importance and weight attached to it.³⁹ Also, these concepts determine the extent to which an argument is permitted.⁴⁰ The formalism surrounding laws and court decisions prohibits a critical analysis of the law, while the accepted writings of legal scholars do provide a mechanism for a criticism of the law. However, it can be problematic putting forward arguments from a legal policy perspective without taking a position in relation to the law as it is.⁴¹ In other words, even the most innovative and creative ideas on the law must receive legitimacy by applying them to the law as is. This in turn places restrictions on the capabilities of the law to provide creative solutions to problems.

Kleineman indicates that it is not uncommon that the law is combined with other subjects from within the social sciences, for example law and philosophy; however, it is primarily the traditional legal science method that is still applied and, even though alternative disciplines can identify inadequacies with the law, the

³⁷ Kleineman, “Rättsdogmatisk metod,” 30.

³⁸ Kleineman, “Rättsdogmatisk metod,” 29.

³⁹ Peczenik, “A Theory of Legal Doctrine,” 79–80.

⁴⁰ Kleineman, “Rättsdogmatisk metod,” 36.

⁴¹ Kleineman, “Rättsdogmatisk metod,” 44.

primary objective is to establish the law as it is. The consequence is that it becomes imperative to distinguish the legal dogmatic and sociological argumentation. For example, a study to quantitatively determine how many times a court has determined a case in a certain manner does not necessarily identify the law as it is. It may be that, of the judgments examined, none has the status of precedent, the consequence being that what was assumed to be the law as it is is overturned by a single judgment of the High Court, which has the authority of a precedent-giving institution.⁴² It can be argued, however, that there are insights to be gained from quantitative analyses, although the traditional legal science method may look somewhat unapprovingly to incorporating such analyses in legal argument.

A central question put by Kleineman is whether it is possible to incorporate achievements from the social sciences into the application of the traditional legal science method. The answer provided is that this is possible when examining the law from a critical perspective but not when determining the law as it is, a compounding factor being that there is an unwillingness of legal practitioners to include achievements from the social sciences in the application of the traditional legal method, resulting in a mistrust of the legal fraternity.⁴³ This highlights two important issues. The first relates to what has been reiterated above, namely that the traditional legal science approach is reluctant to consider influences from other disciplines. The second is the mistrust that this creates in relation to the legal fraternity. Both these issues in turn make it difficult for legal researchers and practitioners potentially to work with representatives from other disciplines in finding creative solutions to the complex problems that technology creates but also in embarking on interdisciplinary initiatives.

Illuminating Legal Informatics

Legal informatics is a branch of traditional legal science, which means that “problems are defined and dealt with according to

⁴² Kleineman, “Rättsdogmatisk metod,” 38–39.

⁴³ Kleineman, “Rättsdogmatisk metod,” 41.

criteria, which the legal community consider relevant and comprehensible.”⁴⁴ Seipel states that it “strives to go beyond traditional, text oriented analysis of valid law, (normative or ‘dogmatic’ legal science).”⁴⁵ This in turn is done by providing perspectives from the field of informatics, which can be described as an academic discipline that “encompasses many fields where information plays a central role; system theory, computer science, communication theory, information security theory, cognitive science, and library science, to mention a few” and “is intrinsically associated with higher ambitions and a strive to develop a theoretical platform that extends beyond traditional (dogmatic) legal science.”⁴⁶ Legal informatics, therefore, can be described as a legal method that incorporates yet advances the traditional legal science methodology.

A central pillar of legal informatics is the study of the relationship between two areas, namely law on the one hand and technology (represented by ICT [information and communication technology]) on the other.⁴⁷ Central to legal informatics is the subfield called “law and ICT,” which is characterized by the study of this bidirectional relationship between these two areas, law and ICT. This bidirectional relationship can be formulated in two ways: first in terms of the legal regulation of ICT, that is, the use of substantive law to regulate technology, and, second, “the use of ICT for legal purposes,” that is, the use of technology for regulatory purposes.⁴⁸ Put another way, ICT law is a combination of the field of “the legal regulation of computers,” or “rules” and the study of the field of “the legal use of computers,” namely “tools.”⁴⁹ At the core of legal informatics, therefore, is the study of the intersection

⁴⁴ Peter Seipel, “IT Law in the Framework of Legal Informatics,” in *IT Law*, ed. Peter Wahlgren, Scandinavian Studies in Law 47 (Stockholm: Scandinavian Institute for Scandinavian Law, 2004), 32.

⁴⁵ Seipel, “IT Law in the Framework of Legal Informatics,” 32.

⁴⁶ Seipel, “IT Law in the Framework of Legal Informatics,” 33.

⁴⁷ Peter Seipel, “ICT Law – A Kaleidoscope View,” in *Information & Communication Technology: Legal Issues*, ed. Peter Wahlgren, Scandinavian Studies in Law 56 (Stockholm: Scandinavian Institute for Scandinavian Law, 2010), 37.

⁴⁸ Peter Seipel, ed., “Law and ICT: A Whole and Its Parts,” in *Law and Information Technology: Swedish Views*, Swedish Government Official Reports 2002:12 (Stockholm: Fritzes offentliga publikationer, 2002), 23.

⁴⁹ Seipel, “IT Law in the Framework of Legal Informatics,” 33.

between these two branches.⁵⁰ Legal informatics therefore by definition encapsulates a two-way perspective, the notion referring not only to the manner in which ICT affects society (“tools”) but also the manner in which society impacts on technology (“rules”). An example is the study of the extent to which social choices, preferences, and tradition affect technology (and the interaction of this bidirectional relationship).⁵¹ In other words, legal informatics examines “how the relationships between legal regulation and technical tools ought to be dealt with.”⁵²

In theorizing on how to examine ICT law, a question put by Seipel regards whether there is a link between examining ICT law from a “use” point of view as well as from a “regulation” point of view.⁵³ The common denominator, according to Seipel, is that both require a solid understanding of ICT, more specifically ICT in the legal perspective.⁵⁴ A superficial understanding of ICT and how it interacts with the law does not suffice—rather, a deeper understanding of this interaction is required.⁵⁵ Here reference is made to the use of ICT by creating new infrastructures that subsequently become a legal concern. It is this relationship that allows for the considering of issues that are not strictly speaking “legal issues” yet are important from the regulatory perspective.⁵⁶ It is best put by Seipel himself:

In this way it is signalled that rules and tools constitute a dynamic whole, that rule elements and tool elements are interconnected, and that a deep understanding of law and IT is related to both

⁵⁰ Seipel, “ICT Law – A Kaleidoscope View,” 41.

⁵¹ Peter Seipel, “Legal Informatics Broad and Narrow,” in *Legal Management of Information Systems: Incorporating Law in e-solutions*, ed. Cecilia Magnusson Sjöberg (Lund: Studentlitteratur, 2005), 25. In addition, for an in-depth and more practical example of the application of a legal informatics approach, see Cecilia Magnusson Sjöberg in this volume. Here Magnusson Sjöberg applies the bidirectional approach in the examination of the interaction of technology, in the form of algorithms and machine learning and the law, represented by the notions of data protection and privacy.

⁵² Seipel, “IT Law in the Framework of Legal Informatics,” 32.

⁵³ Seipel, “Law and ICT: A Whole and Its Parts,” 26–27.

⁵⁴ Seipel, “Law and ICT: A Whole and Its Parts,” 26–27.

⁵⁵ Seipel, “Law and ICT: A Whole and Its Parts,” 25.

⁵⁶ Seipel, “Law and ICT: A Whole and Its Parts,” 25.

rule and tool elements. In other words, in order to understand the interplay of law and IT, it is necessary to consider both rule and tool aspects and only a combination of the two can lead to a full understanding.⁵⁷

The above is illuminated by Seipel when he states that a new technology may create possibilities to improve the application of a legal right, such as the legal right to access information, while an existing regulation may prohibit this same right, considering it harmful or risky. Also of importance is the actual degree of interplay between law and ICT. Seipel, in referring to the “and” in “law and ICT” states that it signifies “interplay,” “interaction,” and “mutual dependencies.”⁵⁸ A consequence of this necessary way of thinking is that both the theoretical and practical facets of this relationship must be studied, one example of a theoretical facet being how the automation of information processing affects legal thinking.⁵⁹ In addition, it is not random phenomena that require scrutiny but, rather, there are a number of general categories that comprise the field of information technology: automation, information, communication, integration, penetration, and sensation.⁶⁰ Sensation concerns how information processing tools interact with human senses, experiencing, and thinking. Two further attributes constitute legal informatics as a result of this back-and-forth examination of “rules” and “tools.” First, concepts and definitions play an important role and are in focus and must continually be examined in the light of the “rules” versus “tools” distinction. Second, it fosters an interest in the information processing structures of society, where topics such as power relations based on information processing and legal steering of the information society are addressed.⁶¹

Central to legal informatics is that, rather than solving problems reactively and after the fact (*ex post*), there is an element of

⁵⁷ Seipel, “IT Law in the Framework of Legal Informatics,” 35.

⁵⁸ Seipel, “Legal Informatics Broad and Narrow,” 26. For a more in-depth discussion of the “and” in “law and ICT,” see Seipel, “IT Law in the Framework of Legal Informatics,” 35.

⁵⁹ Seipel, “IT Law in the Framework of Legal Informatics,” 35–36.

⁶⁰ Seipel, “IT Law in the Framework of Legal Informatics,” 36. The description of what these categories entail is provided by Seipel.

⁶¹ Seipel, “IT Law in the Framework of Legal Informatics,” 38.

problem-identification and problem-solving in advance (*ex ante*). A commonly used concept in this regard is “proactive law.”⁶² There are a number of ways of describing proactive law: as a language for problem formulation, analyses, and theory-building in a fragmented environment and where scholars from different disciplines are able to communicate; another way is as a “perspective” or “world view.” An advantage with the latter is that it negates the view that proactive law is something totally novel and a threat to “traditional law.”⁶³ The notion of perspective is also important from the point of view that “[e]ven small changes of perspective can make us see things differently and in a new way.”⁶⁴ An important basis accepting proactive law is derived from the manner in which one views the function of law. In this regard, a useful starting point is to identify legal systems as dynamic and to view “law as a conceptual system subject to change and law as a system intended to produce as well as to accommodate changes in social structures.”⁶⁵

Legal informatics is also concerned with looking into the future and Seipel refers to the field of “legal futurology,” where traditional legal research could be complemented with a “prognostication of developments in the legal system and with future-oriented policy issues.”⁶⁶ Seipel therefore suggests, in addition to the established categories of law *de lege lata* and *de lege ferenda*, a third category of compartmentalization of the law, namely *lex ponderanda*, meaning “probing law” or “speculating law,” it also being described as “a speculative, critical analysis of the law,” reflecting the proactive way of working.⁶⁷

Legal informatics is also influenced by a number of elements that are central to the law and ICT bidirectional relationship,

⁶² Seipel, “IT Law in the Framework of Legal Informatics,” 40. See also, Peter Seipel, “Nordic School of Proactive Law Conference, June 2005: Closing Comments,” in *A Proactive Approach: Law Libraries*, ed. Peter Wahlgren, Scandinavian Studies in Law 49, (Stockholm: Stockholm Institute for Scandinavian Law, 2006), 360.

⁶³ Seipel, “Nordic School of Proactive Law Conference,” 359–360.

⁶⁴ Seipel, “Nordic School of Proactive Law Conference,” 359.

⁶⁵ Seipel, “Nordic School of Proactive Law Conference,” 362.

⁶⁶ Seipel, “Nordic School of Proactive Law Conference,” 362.

⁶⁷ Seipel, “Law and ICT: A Whole and Its Parts,” inside back cover. See also Seipel, “Nordic School of Proactive Law Conference,” 362.

namely: automation, information, communication, integration, and sensation.⁶⁸ The element of sensation is relevant to the extent that human beings sense with their brain and body but also with their tools and that there is no dividing line between the “inside” and “outside” of a person’s mind.⁶⁹ Seipel states, “[a]s for ICT, we are only beginning to understand the consequences. And a legal understanding hardly exists.”⁷⁰

The historical perspective of legal informatics also gives it its distinct nature. It is the acceptance of subjects such as legal thinking based on quantitative and formal reasoning, by Loevinger in 1949, and the use of cybernetics in law, by Wiener in 1954, which can be seen as the forerunner to legal informatics.⁷¹ It is therefore argued that the greater acceptance of such subjects by legal informatics gives it access to a larger body of knowledge for solving problems but also endows the legal profession with a greater receptiveness toward solutions that may not necessarily fall within the strict confines of the traditional legal science method of addressing problems.

A final insight that is illuminated by Magnusson Sjöberg relates to the fact that, in studying the bidirectional relationship between technology and the law, it is not only technology that bears inherent complexities. A study of the law too may reveal that there are multiple relevant regulatory frameworks that must be considered, and that these regulatory frameworks may not necessarily be in alignment with each other, in turn compounding the complexities.⁷²

Enriching the Tools for a Legal Analysis

From the above it is clear that there are some major differences between the traditional legal science method and legal informatics.

⁶⁸ Seipel, “Law and ICT: A Whole and Its Parts,” 22–23.

⁶⁹ Seipel, “Law and ICT: A Whole and Its Parts,” 22.

⁷⁰ Seipel, “Law and ICT: A Whole and Its Parts,” 22.

⁷¹ Seipel, “IT Law in the Framework of Legal Informatics,” 43. Here reference is made to Lee Loevinger, “Jurimetrics the Next Step Forward,” *Jurimetrics Journal* 12, no. 1 (September 1971) and Norbert Wiener, *The Human Use of Human Beings. Cybernetics and Society* (London: Eyre and Spottiswoode, 1954).

⁷² Cecilia Magnusson Sjöberg in this volume.

The former remains a static, rigid, and relatively closed system for ascertaining the law as it is, while legal informatics is a more dynamic system, open to external influences in the form of knowledge from other sciences, and potentially having a more liberal attitude toward the function of the law.

Having said this, it may very well be that there are valid reasons for any legal system to be rigid in nature and that the traditional legal science method promotes these qualities with a purpose in mind. As part of its problem-solving function, legal systems are required to promote stability. Legal systems usually incorporate the values, morals, and norms held dear by a society. These in turn find their expression in the form of legal rights and duties and entrench values such as dignity, autonomy, and privacy, to mention but a few examples. A well-functioning society also requires predictability, for example in economic matters but also criminal matters. Consequently, a person must be aware that, if he or she performs a criminal act, a punishment will follow but also that entering into a contract will have predictable consequences that can be relied on. The main point argued here is that legal rigidity does have an important function so that the common societal values that have been worked out over hundreds of years are not discarded overnight. It would also be detrimental to society if these values fluctuated from one day to the next. For example, the law should have an internal rigidity that does not sway under popular incentives in, say, times of economic hardship. Simply put, there is a very legitimate reason underlying the composition of the traditional legal science method as well as the complexity and lengthy process of traditional legal regulation. However, as argued here, there is the risk that many potential creative solutions addressing the vulnerabilities associated with technology may go wanting to the extent that they are automatically discarded by too restrictive a legal approach.

Probably the most telling distinction between the traditional legal science method and legal informatics is the latter's obligation of focusing on the bidirectional relationship between law and ICT that constitutes legal informatics. This obligation, it is argued, is not inherent in the traditional legal science method and a legal analysis of just "rules" or just "tools" would suffice. Seipel states:

rules and tools constitute a dynamic whole, that rule elements and tool elements are interconnected, and that a deep understanding of law and IT is related to both rule and tool elements. In other words, in order to understand the interplay of law and IT, it is necessary to consider both rule and tool aspects and only a combination of the two can lead to a full understanding.⁷³

In addressing a problem that arises as a result of technology, a legal practitioner applying the traditional legal science method could choose to focus on only the regulation of ICT or only the effect of the increased use of ICT on the law or society, and this would suffice as an acceptable application of the traditional legal science method. However, according to legal informatics, this would not suffice. Legal informatics demands an in-depth investigation of both the technology at the heart of a problem and the legal aspects triggered by the technology.

Another major distinction between the traditional legal science method and legal informatics relates to the degree of receptiveness to research from other sciences. It is argued that there are limitations to treating the law as a system segregated from society. The law does not operate in a vacuum but influences and is influenced by society at large.⁷⁴ This in turn leads to the contention that law, having the problem-solving function that it has and being a tool for dealing with reality, should be built upon an as accurate a view of reality as possible and therefore be based on scientific study.⁷⁵ Therefore, the law should be dependent on material from other sciences besides law.⁷⁶ The extent to which traditional legal science is and should be receptive to other sciences is, however,

⁷³ Seipel, "IT Law in the Framework of Legal Informatics," 33.

⁷⁴ Fredric Korling, *Rådgivningsansvar – särskilt avseende finansiell rådgivning och investeringsrådgivning*. Dissertation (Stockholm: Jure, 2010), 49.

⁷⁵ See Niklas Luhmann, *Law as a Social System*, trans. Klaus A. Ziegert, eds. Fatima Kastner and Richard Nobles (Oxford: Oxford University Press), 136. "The resulting dissolution of the sharp demarcation between jurisprudence and sociology has given rise, since the beginning of this century, to the hope that sociology will be able to make a contribution to the administration of justice. From the perspective of the law, however, sociology's function remains more that of an auxiliary science." The above author and citation referred to in Korling, *Rådgivningsansvar*, 49.

⁷⁶ Korling, *Rådgivningsansvar*, 49.

a subject of much debate.⁷⁷ While some argue that the influence from other sciences should be limited, there are those that argue that all sciences are potentially relevant for solving legal problems and that there should be no hierarchy as to the importance of these other sciences.⁷⁸ In this regard, the law cannot be viewed as an independent phenomenon that is separate from society, a potential result of this being that seemingly rational solutions to problems ultimately lead to irrational and unacceptable consequences.⁷⁹ Researchers who rely on knowledge from the other sciences create new knowledge regarding the rationality of the law as opposed to traditional legal dogmatic doctrine, which stays within the frame of the central sources of law and therefore the constructed and closed legal system.⁸⁰ The aim of research is to improve not only the law but also the rationality of making decisions in relation

⁷⁷ Reference is made to the debate within the Swedish context concerning the acceptability of referring to other sciences in order to interpret a legal rule. In this regard, see Lars Heuman, "Hjälpvvetenskapernas betydelse för rättstillämpning och rättsvetenskapen," *Juridisk tidskrift*, no. 4 (2005–06): 768. Heuman states that other sciences may be used as a source of law only as the exception and where there exists a legal rule that lacks linguistic precision or where it has certain objectives or requires a balancing of interests (789, paraphrased by the author). Heuman states that if another science, besides legal science, can prove that a legal rule or precedent is built upon incorrect prerequisites, the courts cannot ignore or retranslate the legal rule due to the fact that law and precedent shall be respected even where criticism can be levied at the solutions chosen by the legislator (772, paraphrased by the author). Finally, Heuman distinguishes between different sciences in the event that they are of relevance for legal science, some more suitable than others (789, paraphrased by the author). See also Gräns, "Om hjälpvvetenskapernas betydelse för rättstillämpning och rättsvetenskapen," 782, where Gräns states that it is not the linguistic precision of a law that should determine the relevance of other sciences, but rather the extent to which knowledge can be gained from the other sciences in order to interpret that legal rule (786, paraphrased by the author). Finally, for a description of the extent to which traditional legal science already incorporates research from other sciences, see Gräns, "Allmänt om användning av andra vetenskaper inom juridiken."

⁷⁸ Gräns, "Om hjälpvvetenskapernas betydelse för rättstillämpning och rättsvetenskapen," 782.

⁷⁹ Gräns, "Allmänt om användning av andra vetenskaper inom juridiken," 437.

⁸⁰ Gräns, "Allmänt om användning av andra vetenskaper inom juridiken," 438.

to reality where the consequences will be realized.⁸¹ The above debate highlights the varying opinions regarding the application of the traditional legal science method. This, it is argued, can result in uncertainty and potentially lead to a more conservative approach to applying the law. Finally, the debate concerning whether law should take other sciences into account might be merely theoretical, some arguing that a more pragmatic approach has long been the norm.⁸² What is clear is that it would be foolish to attempt to argue that all practitioners of the traditional legal science method apply it strictly as laid out above. Even among proponents of this method, there are divergent opinions as to whether the traditional legal science method is receptive to other disciplines or not, as well as the extent to which this is so. However, its theoretical basis does lead one to believe that it is more conservative in its acceptance of knowledge from other disciplines and is lacking in its ability to address effectively the challenges associated with complex technologies.

Another advantage of legal informatics, especially in relation to AI, is that legal informatics by its very nature forces an examination of the incorporation of the cognitive sciences in technology. This is done via the concept of “informatics,” which, as was mentioned above, incorporates the study of the cognitive sciences.

⁸¹ Gräns, “Allmänt om användning av andra vetenskaper inom juridiken,” 437–438.

⁸² Luhmann, *Law as a Social System*, 36: “In the classical division of labor between jurisprudence and sociology, jurisprudence is concerned with norms, and sociology, in contrast, with facts. The jurist’s task is to interpret norms and apply them. The sociologist may concern himself only with the existing context of the law, with its social conditions and consequences. But this classical view was already out of date, if not anachronistic, even at the time when Hans Kelsen gave it its most precise formulation. ‘Social-engineering’ approaches and the jurisprudence of interests had tied the application of law to facts that had not been taken into account in formulating norms but instead had to be ascertained subsequent to the formulation of the legal text. Pragmatism had postulated that all practical application of the law should consider how different constructions of the law would affect legal outcomes; it was concerned not only with the impact on future decisions within the legal system but also with controlling actual consequences within social reality.” The above author and citation referred to in Korling, *Rådgivningsansvar*, 49.

Another argument favoring legal informatics is that the traditional legal science method should not take precedence automatically, which sometimes seems to be the case. In other words, the knee-jerk reaction of automatically merely applying the traditional legal science method should be reflected upon. In fact, it is stated that the traditional legal science method should never prevail at the expense of other legal processes or methods that solve a problem in a better fashion, while at the same time upholding basic quality demands that legal doctrine requires.⁸³ This means that the legal method that best solves a problem while at the same time upholding the required principles of law, for example the rule of law, must be applied.

In addition, applying the traditional legal science method potentially limits the notion of what law is. This method only acknowledges a limited number of central legal sources, which can be characterized by their form, namely black ink on white paper. In other words, the traditional attitude is that laws are only that which is written in natural language. However, it is argued that legal informatics allows for and even promotes a broader notion of what the law is. This notion incorporates the view that anything that regulates human behavior should be recognized when addressing regulatory aspects of the law. Therefore, programming code, technical solutions, standards, and ethical codes should also be incorporated in the notion of law due to regulatory effect. This can in turn be connected to the above statement regarding the choice of the best solution to a problem principle, where alternative forms of law, such as soft law, should be the first-choice solution.

A final argument concerns the need for speed. In other words, considering the pace at which technologies such as AI develop, to what extent is the traditional legal science method able to keep abreast of these developments? The response once again is offered by Seipel, who states that it is:

not enough to rely on slow and minimal adjustments of legal terminology *et cetera*. Whole legal norm structures may need to

⁸³ Wahlgren, "Automatiserade juridiska beslut," 404–405.

be reconsidered, including such elements as basic aims and ideas, stake holders, means of legal steering, and ways of implementation (how to reach goals).⁸⁴

Conclusions

This chapter began with an illustration of how complex the digital environment has become by describing the use of AI in conjunction with the cognitive sciences. By doing so it highlighted the complexity of the risks and problems associated with these technologies and in doing so the necessity for complex solutions. This chapter then set out to describe the traditional legal science method in the context of law as a mechanism for problem-solving. It then proceeded to elevate legal informatics as a legal approach, extending the traditional legal science method and promoting its suitability for solving complex societal problems in the context of complex technologies. In doing so, legal informatics was compared to the traditional legal science method, a legal method that legal informatics is built upon but also extends. What this chapter has hopefully illuminated is that, unlike technology, the subjective nature, composition, and application of the law as a phenomenon is as far from the digital “on or off,” nature of technology as could possibly be. There is no “right or wrong” or “good or bad” alternative and the choice of legal method and approach depends on personal preferences and on subjective (and potentially even biased) considerations. The aim of the chapter was to illuminate the strengths of legal informatics due to its acceptance of other sciences and due to its interdisciplinary nature. In other words, there is a point to accepting knowledge from other sciences into the legal realm in order to make sound legal judgments that mirror reality. The extent to which this ought to occur may for all intents and purposes remain the topic of many a debate. What is certain, however, is that legal informatics is an approach that by default advances the ideals of the digital human sciences. It advances the applicability of law as a solution to the challenges associated with the complexity of digitalization with not only a focus on technology itself but also its two-way relationship with society.

⁸⁴ Seipel, “ICT Law – A Kaleidoscope View,” 37.

Furthermore, it is more receptive to interdisciplinary cooperation, thereby facilitating research initiatives that transcend the rigid borders of various disciplines and advocate solutions based on reality.

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