Borderlands of the Law and Technology: from Digital Machines to LegalTech

Maria Dymitruk

1. Introduction

Since the creation of first computers[1] capable of automatically processing data due to software, i.e. due to inputting of a schedule of tasks to be performed into the memory of the machine, the borderlands of the law and technology has become an area of interest of many scholars, rekindling bold images of improving the work of lawyers and the functioning of the entire legal system. Inspired by the potential of "digital machines[2]", lawyers quickly began to consider the possibility of applying technological achievements in the area of law. The first "wave" of technological development, which may be equated to LegalTech 1.0, crashed through the legal sector much later – principally in the 1980s and 1990s. During that period, the first commercial legal databases became popular (such as Westlaw or LexisNexis), accelerating the process of searching for information on the law and improving the day-to-day legal analysis by virtue of computer-assisted legal research (CALR). At the next stage of development, electronic databases publishing the contents of normative acts, case-law and the writings of the doctrine transferred to the online sphere, allowing for instant access to legal information that is updated in real-time. Each new "wave" of technological changes improved, and over time automated further components of the work of lawyers, leading to significant surge of interest in legal profession-related technologies among the practitioners (the so-called LegalTech boom) during the last few years. At first, LegalTech solutions served to improve and automate non-substantive activities

1 The first digital computers were created in the 1940s. One of the first of those was the ENIAC (Electronic Numerical Integrator and Computer), constructed in the USA in the mid-1940s.

2 The term "computer" did not take hold all over the world at first. For instance, a computer was addressed in Poland with the monikers of a "digital machine", a "cybernetic machine", or a "mathematical machine". It was not a coincidence that the first computer manufactured in Poland (1960s) was named "UMC" ("Uniwersalna Maszyna Cyfrowa", Universal Digital Machine).

that were clerical or organisational (such as organising cases, managing electronic casefiles, invoicing, registration of working time, etc), in time allowing for support of substantive work of lawyers through automation of legal decisional processes.

Over the span of years, technological trends in the legal sector changed many times. Certain tendencies are, however, constant: lawyers that are also members of the academia are fascinated by technologies, capabilities and by dangers posed by the former for the law, and practitioners are continuously characterised by faint praise for (at times revolutionary) changes that are brought by technological development in the scope of their work. The description of transformations that the respective components of the legal landscape are undergoing in the broadly viewed area of IT is provided in many chapters of this monograph. The object of this chapter is not to reiterate them or to provide a synthesis thereof, but to present the development of academic research on the technological transitions in the law[3]. In that regard, one must stress that while the conservative approach of the majority of practitioners to new technologies induced the adoption of a slow schedule (belated when compared to other sectors of the economy) for adapting innovation in the area of law, the legal academia have always boldly looked into the future, often surpassing the actual capabilities of implementation in the field of IT and the law by decades.

For the purposes of avoiding any doubt, it must be emphasised at the very beginning that, from the academic point of view, there are many disciplines at the intersection of the law on one hand, and the mathematical sciences and informatics on the other: above all, legal informatics[4],

3 This work makes no claim to be a definitive description for the stages of developing research on IT applications in the law. Its purpose is simply to indicate approaches to research in order to present the academic landscape that led to the creation of LegalTech, and the changes which that landscape underwent over the years, in an illustrative manner.

4 It is not possible to create a single, uniformly accepted definition of legal informatics, and thus it is expedient to restrict the description of legal informatics to a term referring to the research on drafting and applying the law through the use of computers. For more on that subject see Abdul Paliwala (ed), *A history of legal informatics* (Series 9 LEFIS, Prensas de la Universidad de Zaragoza 2010) 1-287; Jacek Janowski, *Informatyka prawnicza* (C. H. Beck 2011) 2 – 14; Jacek Janowski, *Informatyka prawa. Zadania i znaczenie w związku z kształtowaniem się elektronicznego obrotu prawnego* (Wydawnictwo UMCS 2011) 328 – 340; Jacek Petzel, *Informatyka prawnicza. Zagadnienia teorii i praktyki* (LIBER 1999) 13 – 32.

but also legal cybernetics[5] and jurimetrics[6]. The trends indicated above intertwine with one another, at times having inseparable fields of research. Nevertheless, they are joined primarily by the fact that all of them are theoretical and legal disciplines that fully draw from the achievements of science. Those disciplines are further linked to other fields of science on new technologies in the law (mainly doctrinal disciplines that are of interdisciplinary nature, aimed at researching the connection of substantive or procedural legal issues with the subject of technology), and often to the traditional areas of jurisprudence, such as the theory of law, legal logic, or philosophy of the law.

Somewhat in opposition to the theoretical deliberations on the influence of technology on the law, one could present LegalTech. This is because that is not a scientific discipline, but more of a field of business. While legal informatics and its cognate scientific disciplines address academic research and the creation of theoretical foundations for the purposes of future implementation, LegalTech should be viewed from the point of view of application. However, given that LegalTech is based on using contemporary IT in the area of law[7], it could be assumed for the sake of simplicity that it constitutes an application of the achievements of legal informatics and related fields of study in legal practice. It constitutes a fragment of the economy, connecting the technological market with the market in legal services and with the broadly construed public legal space. It is therefore not surprising from the point of view of applicable terminology, that the use of "legal informatics" and cognate disciplines is preponderant in the academic literature, while the concept of LegalTech is used mainly by legal

5 The capability of applying cybernetics (the science of control and transmission of information connected thereto) in the area of law is subjected to analysis within the framework of that trend. Mario Giuseppe Losano is considered to be the creator of cybernetics. See Mario Giuseppe Losano, *Giuscibernetica: Macchine e modelli cibernetici nel diritto* (Einaudi 1969), and Giuseppe Contissa, Francesco Godano and Giovanni Sartor, 'Computation, Cybernetics and the Law at the Origins of Legal Informatics' [in:] Simona Chiodo and Viola Schiaffonati (eds), *Italian Philosophy of Technology: Socio-Cultural, Legal, Scientific and Aesthetic Perspectives on Technology* (Vol. 35, Springer 2021) 91 – 110.

6 Jurimetrics is concerned with the application of quantitative methods (especially probability and statistics) to the law. Lee Loevinger is considered to be its creator. See Lee Loevinger, 'Jurimetrics: The Next Step Forward' (1949) 33, 5 Minn L Rev 455 – 493.

7 See more on that subject in the chapter "The Concept of Legal Technology (LegalTech). Legal engineering", authored by Dariusz Szostek.

practitioners or by the representatives of the technology sector, who offer their products to lawyers or to public decision-makers.

It must be however stressed that the existence of the LegalTech sector which is directly linked to using IT solutions by lawyers (and, in technologically advanced instances of automation – also without the participation of lawyers, but for legal purposes) would not be possible if not for the prior theoretical and legal analysis of the possibilities of such application. Thus, it must be stated that the current popularity of practical IT applications in the field of law is the result of the earlier efforts of the members of the academia, who have already been exploring the issues created at the cusp of legal sciences and informatics for several decades. The aim of the present chapter is therefore to present the academic foundation, constituting a cornerstone of the current success of the LegalTech market, in two main areas: 1) legal information retrieval, legal IR, and 2) automation of legal decisional processes, including legal decision support systems (legal DSS), for they constitute the core of the LegalTech market in its current shape.

2. *Searching for Information on the Law*

Legal informatics, since time immemorial and by definition[8], concerns itself with processing information on the law. A basic prerequisite for the system of law as such to function is its universality and the availability of information on the legal provisions in force, because those are the foundations of the legal assumption that awareness of the law is universal. Thus, it should come as no surprise that automatic search for (dispersed) legal information was, since the beginning, one of the main tasks the scholars addressing the potential of using technology in the law set for themselves. "Manual" search through huge (originally paper-based) databases was always a significant challenge in legal practice, being at the same time one of the key, but also one of the most time-consuming and labour-intensive tasks of a lawyer. Together with the development of the law, and with the occurrence of the phenomenon of regulatory inflation, that core of legal work became exceptionally onerous[9]. This problem was already addressed

8 For informatics is the science of processing information.

9 This problem became apparent earlier in the USA (compared to European countries). As early as in the early 1960s, there was a big discussion in the American legal community on the excessively swift growth rate of data with which a lawyer had had to familiarise him- or herself to carry out comprehensive legal analysis

in 1958 by Lucien Mehl, who in a paper titled "Automation in the Legal World: from the Machine Processing of Legal Information to the "Law Machine[10]" pointed to the mechanisation of information retrieval as a remedy, positing that the purpose of that process would be the automatic discovery of relevant precedent (mainly in the scope of the common law systems), requisite article of a normative act (primarily in the scope of systems of continental law), or a fitting excerpt from the academic works.

1960s brought a much-appreciated initiative of John F. Horty of the University of Pittsburgh, who created the first automatic legal information retrieval system[11]. The prosaic reason due to which that system was created had been the request of the Pennsylvania state authorities, wishing to minimise the financial strain and time considerations induced by the need to alter one phrase that the state administration was using, that is substituting the phrase "retarded child" with the more neutral phrase "exceptional child[12]". The system created by John Horty was capable of automatically finding legal enactments using certain phrases (here: primarily the terms "child" and "retarded") which does not appear to be something exceptionally difficult today, but at that time constituted an undeniable breakthrough. That achievements later allowed for creation of the first commercial legal information retrieval systems, such as ASPEN and, later, LITE[13]. The second of the mentioned databases was, moreover, the biggest database of legislation and case-law in the USA in the 1970s[14]. It is specifically worth noting that, while lawyers were never viewed (and still are not viewed) as the "technological vanguard", the first text information retrie-

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(see William G. Harrington, 'A Brief History of Computer-Assisted Legal Research' (1984) 77, 3 Law. Libr. J. 543. In Europe, the phenomenon of "information crisis in the law" was belated for at least a decade (Petzel (n 4) 209). (see William G. Harrington, 'A Brief History of Computer-Assisted Legal Research' (1984) 77, 3 Law. Libr. J. 543. In Europe, the phenomenon of "information crisis in the law" was belated for at least a decade (Petzel (n 4) 209).

10 Lucien Mehl, *Automation in the legal world* (National Physical Laboratory 1958) 755.

11 Jon Bing, 'Performance of Legal Text Retrieval Systems: The Curse of Boole' (1987) 79 Law. Libr. J. 187.

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

13 LITE is the abbreviation of Legal Information Through Electronics.

14 For more on the subject of those systems, and on other examples of legal information retrieval systems, see Jacek Petzel, *Systemy wyszukiwania informacji prawnej* (Wolters Kluwer 2017) 372; Harrington (n 9) 543 – 556.

val systems were created due to their efforts[15]. However, this conclusion should not give one pause, for the law is an area profoundly based on text, and the need to use textual information while in legal practice at times far exceeds such a need within other areas of societal life. Thus, it should come as no surprise those were the lawyers who, as one of the first, actively participated in the work on the automation of information retrieval from text.

Ever more frequent commercial implementation successes in the scope of legal information retrieval in the law obviously were corresponding to the development of research in that field. From the simple search based on keyword and Boolean algebra, the research on IR in the law underwent a long process, and one that was also reinforced by the achievements in the field of research on the AI[16]. It needs to be pointed out that the producers of commercial legal information databases long refrained from transitioning to more advanced approaches to IR, which was met with criticism not only by the academia, but also by the very users of those systems,

15 Jon Bing rightfully highlights that issue, while at the same time pointing out that those early achievements contributed to (significantly later) success of Internet search engines. See Bing (n 187), quote: "*One may point out that though lawyers are not known for being technological avant-gardists, text retrieval was actually developed by lawyers and for lawyers, due to the need to consult the authentic text for legal interpretation. The search engines of the Internet today harvest what was sown by the early efforts of the legal community*".

16 In that regard, an important role was played by *inter alia* research of Carole Hafner on the use of research approaches in the field of AI & Law to improve the quality of legal information retrieval (see Carole Hafner, 'Representation of knowledge in a legal information retrieval system' in: *Proceedings of the 3rd annual ACM conference on research and development in information retrieval* (1980) 139). During the later period, the works of Marie-Francine Moens were also important in the field (see e.g. Marie-Francine Moens, Caroline Uyttendaele and Jos Dumortier, 'Abstracting of legal cases: The SALOMON experience' (ICAIL'97: Proceedings of the 6th international conference on Artificial Intelligence and Law, Melbourne, 30 June – 3 July 1997); Marie-Francine Moens, Caroline Uyttendaele, Jos Dumortier, 'Information extraction from legal texts: the potential of discourse analysis' (1999) 51 International Journal of Human-Computer Studies 1155), and so were those of Edwina Rissland and Jody Daniels (see Jody Daniels and Edwina Rissland 'Integrating IR and CBR to locate relevant texts and passages' (Database and Expert Systems Applications, 8th International Conference, Proceedings, DEXA'97, Toulouse, 1-2 September 1997); Jody Daniels, Edwina Rissland, *'What you saw is what you want: Using cases to seed information retrieval'* in *International Conference on Case-Based Reasoning* (Springer, Berlin, Heidelberg 1997) 325).

which in a way forced the producers to make use of the achievements of the AI & Law trend in that regard[17].

As of now, there are two main approaches to legal information retrieval to be discerned[18]: one based on manual knowledge engineering, and the other based on techniques of natural language processing (NLP)[19]. The first concept is based on inference, in turn based on cases (case-based reasoning, CBR) and on the existence of legal ontologies, by which one should understand formal structures of concepts and relations between them, intended to organise information on a given field of study[20]. In this instance, retrieving information on the law is an attempt of translating how the lawyers classify their cases into the language understandable for a computer system[21].

The second approach to managing automatic legal information retrieval is based on the techniques of natural language processing (automatic linguistic analysis). Through that approach, IR is founded on the assumption that there does not exist a single possible manner of organising knowledge on the law. Here, a computer system enables the user to input search queries in natural language (in a language that humans use for communication between them; non-formalised language). The guiding idea on which NLP systems are based is to enable interaction with computer systems that

17 Petzel (n 14) 269.

18 See Tamsin Maxwell and Burkhard Schafer, 'Concept and Context in Legal Information Retrieval' (Proceedings of the 2008 conference on Legal Knowledge and Information Systems: JURIX 2008: The Twenty-First Annual Conference, 8 July 2008) 63.

19 NLP is the domain of AI which handles automation of analysis, construction, translation and generation of natural language by a computer system.

20 The principal aim of legal ontologies is to formalise the knowledge on the law. To quote Adam Wyner: "*An ontology is an explicit, formal, and general specification of a conceptualisation of the objects and structural relations between those objects in a given domain. It defines a common vocabulary and organization of information which can be shared, tested, and modified by researchers.*" (see Adam Wyner, 'An ontology in OWL for legal case-based reasoning' (2008) 16 Artificial Intelligence and Law 362).

21 Maxwell and Schafer, '(n 193) 64. In that paper see more on the subject of disadvantages and advantages of the approach to IR which is based on the traditional knowledge engineering (specifically, as far as its disadvantages would be concerned, causing low efficacy of that strategy for practical legal applications, including its problems with efficiency and scalability).

is natural for a human[22]. The task for natural language processing models is then to identify and isolate rules of natural language, in such a manner that unstructured data would be converted in a form understandable for a computer system, which then retrieved a respective meaning therefrom[23]. One could then place their greatest hopes for improving both academic and commercial legal information retrieval systems[24] in the development of NLP techniques[25].

3. *The Automation of Legal Decision-Making Processes*

The question regarding the construction of a machine capable of adjudicating legal cases was raised surprisingly early, for in 1948 already, by the founder of legal geometry, Lee Loevinger[26]. Ten years later, Lucien Mahl, in the above cited publication: *Automation in the Legal World: from the Machine Processing of Legal Information to the "Law Machine"* of 1958, theorized not only about the possibility of automating the retrieval of legal information, but also on the automation of legal reasoning. He viewed the latter in two varieties: 1) a narrow one, involving the issuance of decisions within a very specific, specialised area of law, and 2) a wide one that assumed the existence of a "consultation machine" which would be capable of assisting a lawyer in problems originating from several areas of law[27]. He saw this machine as a system based on classical logic, which corresponds to scientists' original ideas about the possible methods of automation of legal reasoning. He illustrated his theoretical assumptions

22 At the same time, it should be recalled that research and implementation in the field of techniques for processing natural language must, to a large extent, occur separately for every language, having in mind the specifics of a given language.

23 As one could easily guess, the main problem for researchers of NLP lies in the nature of human language and the ambiguity inscribed into it.

24 For more on the advantages of NLP for the legal field, see Haoxi Zhong, Chaojun Xiao, Cunchao Tu, Tianyang Zhang, Zhiyuan Liu and Maosong Sun, 'How Does NLP Benefit Legal System: A Summary of Legal Artificial Intelligence', (2020) arXiv:2004.12158 arXiv.org.

25 The LEMKIN project, which is aimed at creating an intelligent legal information system and is headed by Aleksander Smywiński-Pohl (<https://lemkin.pl>/, accessed on 08.02.2021) remains an interesting Polish initiative in the area of using natural language processing techniques.

26 The original wording is "*Why should not a machine be constructed to decide lawsuits?*"; Lee Loevinger (n 6) 455.

27 Mehl (n 10) 768.

using the example of a machine operating within the area of tax law[28]. Tax law - due to its specific, often binary nature - quickly became, moreover, one of the first branches of law on the basis of which actually functioning automation systems have been built. This happened almost twenty years later in 1977, when L. Thorne McCarty presented the TAXMAN system[29], he had developed. This system was concerned with modelling selected aspects of the conceptual structures found in the US legislation relating to the taxation of corporate transformation. The system was able to carry out simple legal reasoning and, based on the description of a case concerning company transformation, analyse the presented facts in terms of selected legal concepts (contained in the provisions of the Code and not resulting from the case-law)[30].

Obviously, academic debate on automation of legal reasoning was closely intertwined with the development of research on AI. The first important contribution in that field is the 1970s paper "*Some Speculation About Artificial Intelligence and Legal Reasoning*" by Bruce Buchanan and Thomas Headrick[31], who may be said to be the founding fathers of the "AI & Law" approach[32]. While the deliberations on the possibility of using AI in order to automate legal decision-making processes were rather preliminary in nature during the 1970s, 1980s brought rapid development of research on AI & Law, resulting in the transition from purely theoretical deliberations to practical actions. For instance, Marek J. Sergot et al. used logic programming during that time to formalise the British Nationality Act

28 Ibid 771 – 776.

29 L. Thorne McCarty, 'Reflections on TAXMAN: an experiment in artificial intelligence and legal reasoning' (1977) 90, 5 Harv. L. Rev. 837.

30 That project was continued as TAXMAN II (see L. Thorne McCarty and Natesa Sridharan, 'The Representation of an Evolving System of Legal Concepts: II. Prototypes and Deformations' (Proceedings of the Seventh International Joint Conference on Artificial Intelligence: IJCAI-81, Vancouver, 24-28 August 1981) 246.

31 Bruce Buchanan and Thomas Headrick, 'Some Speculation About Artificial Intelligence and Legal Reasoning' (1970) 23, 1 Stan. L.aw Rev 40.

32 Bruce Buchanan was one of the creators of the DENDRAL expert system, created a year before that, automating the identification of molecular structure of unknown organic compounds on the basis of the electromagnetic spectrum. In a paper "Some Speculation About Artificial Intelligence and Legal Reasoning" the authors proposed using the DENDRAL's achievements in the legal field, i.e. creating an analogous program which would be able to identify a legal issue and create the potential ways to solve it.

1981[33]. Despite the fact that the Act at issue exhibited typical legislative problems (lexical complexity, ambiguity, and references to hitherto introduced legislation), a major part of that Act was successfully translated into programming language named "Prolog". 1987 turned out to be a breakthrough year for research on AI&Law[34], when the first international ICAIL academic conference (International Conference on Artificial Intelligence and Law) was held[35]. That venue became the main forum for presenting and exchanging opinions in the field of scientific research on AI in law[36]. Interestingly and since the very beginning, the conference served as a venue for demonstration of implementations in the field of automation of decision-making processes in the law, including legal reasoning support systems[37]. For example, Richard Susskind and Phillip Caper presented the Latent Damage System, an expert system whose purpose was to support counsel in applying the UK's Latent Damage Act 1986, during ICAIL'89[38]. What is more, the system thus created was a commercial endeavour, becoming the first expert system in the world meant for lawyers (sold on floppy disks, together with a manual describing the workings of that system), and one which was equipped not only with knowledge on the Act itself and on precedents by British courts, but also with the general context of tort law, law of obligations, and on product liability rules.

The scientific approach to automation of decision-making in the scope of the law, and, by further extension, approach to implementation thereof, were developed in parallel to the general trends in the field of research

33 Marek J. Sergot, Fariba Sadri, Robert A. Kowalski, Frank Kriwaczek, Philip Hammond and Hary T. Cory, 'The British Nationality Act as a logic program' (1986) 29 Communications of the ACM 370.

34 Two very influential academic works (which were extended versions of doctoral dissertations) in the field of AI&Law were published in 1987: An Artificial Intelligence Approach to Legal Reasoning by Anne Gardner and Expert Systems in Law by Richard Susskind.

35 Previous meetings of researchers active in the field of AI&Law were singular in nature.

36 Other important fora for exchange of opinions were in time found in the annual JURIX conference, organised since 1988, and the Artificial Intelligence and Law scientific journal, published since 1992.

37 On the need of greater focus of research on AI & Law on practical applications of theoretical models, already in the 1990s, see Anja Oskamp, Maaike Tragter and Cees Groendijk, 'AI and Lain: What about the Future?' (1995) 3 Artificial Intelligence and Law 209.

38 Richard Susskind, 'The Latent Damage System: a jurisprudential analysis' (ICAIL '89: Proceedings of the 2nd International Conference on Artificial Intelligence and Law, Vancouver 1989) 23.

on AI, going a long way from approaches of symbolic AI that were based on logic[39], which were in time dubbed "Good Old-Fashioned Artificial Intelligence", or "GOFAI" and found their expression largely in expert legal systems, to advanced models within the trend of computational intelligence, including *inter alia* systems based on fuzzy logic[40], neural networks[41], or evolutionary computation, which in practice resulted in, among other things, legal applications of efficient machine learning (ML) systems[42]. The last of those in particular turned out to be in great demand for implementation in the area of law, being the main animating force of the contemporary development of the LegalTech sector. The applications in the scope of legal analytics or predictive analytics based on ML solutions are most prevalent within that sector, both in regard to implementation in legal offices and to the broadly understood public sphere. However, those are to an extent burdened with the problem of the lack of explainability and with difficulties related to the quality of data used to train a ML system (including the issue of bias)[43]. The above constitute key difficulties for responsible implementation of advanced systems automating legal decision-making processes in practice[44], and thus are subject to increased

39 For more on the subject of history of the development of that approach (together with the categorisation of rules-based and case-based reasoning systems, and valuable examples in the scope of CBR systems, such as HYPO and CATO), see the chapter "Computational Legal Problem Solving: What Can LegalTech Learn from the AI and Law Research, and Beyond" by Michał Araszkiewicz.

40 For instance, see Tecla Mazzarese, 'Fuzzy Logic and Judicial Decision-Making: A New Perspective on the Alleged Norm-Irrationalism' (1993) 2 Proceedings of the Computer and Vagueness: Fuzzy Logic and Neural Nets. Informatica e diritto 13; Jacky Legrand, 'Some guidelines for fuzzy sets application in legal reasoning' (1999) 7 Artificial Intelligence and Law 235.

41 See e.g. Jürgen Hollatz, *'Analogy making in legal reasoning with neural networks and fuzzy logic'* (1999) 7 Artificial Intelligence and Law 289; Lothar Philipps and Giovanni Sartor, *'Introduction: from legal theories to neural networks and fuzzy reasoning'* (1999) 7 Artificial Intelligence and Law 115.

42 For more see JC JC Smith, 'Machine Intelligence and Legal Reasoning' (1998) 73 Chi.-Kent L. Rev. 277.

43 For more see the chapter "Computational Legal Problem Solving: What Can LegalTech Learn from the AI and Law Research, and Beyond" by Michał Araszkiewicz.

44 See in that regard (in particular for the automation of judicial proceedings) conference paper:.Maria Dymitruk, 'Need for explainable artificial intelligence in automated judicial proceedings' (Doctoral Consortium at 17th International Conference on Artificial Intelligence and Law, Montreal 17 – 21 June 2019).

interest of academia active in the field of AI&Law[45]. It is very likely that, again, it is going to be the academia that would find a solution to the growing pains of innovative implementations in the field of LegalTech, ensuring safer and more ethical framework for development of legal technologies.

4. Conclusions

To sum up, it is worthwhile to return to the first, purely theoretical deliberations on the possibility of automation within the law. Despite the passing of decades, those retain a certain modicum of relevance due to their universal nature. As Lucien Mehl wrote in 1958, "thus although the juridical machine is suited to conduct legal argument, it is incapable of evaluating facts. This task falls to man, because the factual world often defies pure (rational) analysis. Finally, although the machine may be able to suggest solutions to us, it cannot formulate precepts. Elaborating the principles of law is for man to undertake. A juridical machine can thus only be an aid to the jurist and not a substitute for him. We shall have no "electronic judges" in the world to come, any more than we shall have a machine to rule us"[46]. Regardless of the fact that those words were expressed some 63 years ago, and the degree of generality of theses posited by them partially precludes fully agreeing to them, they are still relevant to a degree – pointing out key (extra-technological) challenges related to the development of legal informatics and the LegalTech sector. After all, Lucien Mehl rightly foresaw that automating systems within the law would better handle legal reasoning which would be an analysis of the sources of law (regardless of whether a precedent or a normative act would

45 On explainability, see Karl Branting and others 'Semi-Supervised Methods for Explainable Legal Prediction' (Proceedings of the Seventeenth International Conference on Artificial Intelligence and Law (ICAIL '19), Montreal, 17 – 21 June 2019) 22; Jeroen Keppens, 'Explainable Bayesian Network Query Results via Natural Language Generation Systems' (Proceedings of the Seventeenth International Conference on Artificial Intelligence and Law (ICAIL '19), Montreal, 17 – 21 June 2019) 42. On the problem of bias see Songül Tolan, Marius Miron, Emilia Gómez and Carlos Castillo, 'Why Machine Learning May Lead to Unfairness: Evidence from Risk Assessment for Juvenile Justice in Catalonia' (Proceedings of the Seventeenth International Conference on Artificial Intelligence and Law (ICAIL '19), Montreal, 17 – 21 June 2019) 83.

46 Mehl (n 10) 778.

be such a source) instead of a reasoning related to facts of a case (including the reasoning completed by making a decision on evidence).

Despite the existence of many problems related to the intersection of the law and technology (which are partially still left unsolved despite increased effort of representatives from both the area of law and the sciences in the field of IT), the majority of the representatives of the LegalTech sector adamantly promote the broadest possible implementation, and acceleration of work on automation. This chapter might have been ended on a somewhat trivial note, to the effect that while academics gladly explore the 'technological' areas in the law, the legal market is characterised by a conservative approach to new technologies and sluggishness in implementing innovations in practice. Thus, intensifying work for the purpose of broadening the use of LegalTech solutions by lawyers remains essential. This thesis is true, yet it does not paint a full picture of results brought by the development of the LegalTech sector.

While there is no place here for carrying out full analysis of potentially dangerous outcomes related to the intersection of the law and technology, and in the scope of automation in particular, it is worth noting that there are extant dangers even within an ostensibly trivial area of LegalTech application, namely legal information retrieval (markedly less controversial than automation of decision-making processes), and such dangers are not trifling matters. To explain the thesis thus posited, one must point to the fact that the reason for the success of legal informatics, and the LegalTech sector as a result, is still found in the processing of information on the law. The examples of developing that processing of information set out in this chapter show the degree to which the capability of IT systems to form automatic conclusions from that processing is key. Unrestricted access to any legal information, dreamt of by scientists over a half of a century ago, appears to come into being as of now, often leading to the situation of the excessive influx of information. That in turn results in the vastness of information (e.g. the hitherto unpublished judicial decisions) being brought *en masse* to the legal information databases, risking the throttling of the area of law[47]. This is not only relevant to the difficulties with "manual" analysis of excessive amount of data by a single lawyer, unable to review thousands of judicial decisions attributed to a given legal provision subject to analy-

47 This risk is pointed out by Tamsin Maxwell and Burkhard Schafer, 'Concept and Context in Legal Information Retrieval' (Proceedings of the 2008 conference on Legal Knowledge and Information Systems: JURIX 2008: The Twenty-First Annual Conference, 8 July 2008) 63.

sis. This problem is equally relevant while using solutions automating legal analysis. An explosion of electronic databases accessible online, filled with hundreds of thousands of judicial decisions, coupled with the capability of creating predictive models based on those decisions[48] may for example result in equalling the importance of a momentous judicial decision by a court of higher instance (which would shape the jurisprudence of lower instance courts in the future) with a single, poorly written, and not very well reasoned decision of a court at the lowest instance. That example rightly shows how many pitfalls (some of which not readily apparent) are borne out of even a prosaic use of technology in the field of law.

The efforts of the academia in braving the subsequent milestones (including every hardship and shortcoming) in the area of technology and the law must thus be viewed with full appreciation. Those efforts led us to a situation where we can observe and analyse the LegalTech market. It is also up to us to appropriately shape the development of that portion of the market, having in mind not automation at any cost, but the complementary effort of humans and technology in offering the highest possible quality of legal services, public legal services included[49].

48 Predictive analysis consists in automatic prediction of probability for certain events to occur in the future on the basis of historic data, e.g. predicting the outcome of judicial proceedings on the basis of data on existing case-law of the courts, and of the facts of the case the outcome of which is being predicted. Its current iteration is most often based on advanced models of machine learning.

49 In that scope see also Frank Pasquale, 'A Rule of Persons, Not Machines: The Limits of Legal Automation' (2019) 87, 1 Geo. Wash. L. Rev. 1.