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LEGAL TECHNOLOGY: ARTIFICIAL INTELLIGENCE AND THE FUTURE OF LAW PRACTICE

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Lawyers are increasingly told that advanced technology is coming soon to their doorsteps and will radically change the nature of their work. Such premonitions are often vague and not particularly threatening to a profession that has happily operated in much the same way for over a century. This paper examines the notion that technology will radically disrupt the legal profession by first describing the drivers of modern technological progress and the recent rise of artificial intelligence (AI). It then considers what current technology trends might mean for the legal profession, concluding that technology is likely, in a relatively short period of time, to transform how legal services are delivered.

I. THE SECOND MACHINE AGE

In their book *The Second Machine Age*,[1] Eric Brynjolfsson and Andrew McAfee argue that humanity is on the brink of massive technological breakthrough. Drawing on anthropologist Ian Morris' work,[2] Brynjolfsson and McAfee point out that human social development[3] was relatively gradual until technological developments in the late eighteenth century bent the curve exponentially.[4] In particular, the steam engine enabled previously unimaginable physical feats, leading to mass production, mass transportation, and railways.[5] As Morris writes, "Even though [the steam] revolution took several decades to unfold… it was nonetheless the biggest and fastest transformation in the entire history of the world."[6] This transformation ushered in what the authors call the 'first machine age.'

A. The Foundations, Impact, and Pace of Change

Brynjolfsson and McAfee argue that a 'second machine age' is imminent and that it will be as transformative as the first one. The authors offer three reasons why the second machine age is imminent. The first reason, exponential technological progress, refers to the fact that computing power per dollar has doubled roughly every eighteen months since the 1960s, a phenomenal known as "Moore's Law".[7] To illustrate the pace of exponential growth, the authors note that the fastest supercomputer in the world in 1997, which cost $55 million and was nearly the size of a tennis court, was matched nine years later by a $500 video game system, the Sony PlayStation 3.[8] If this pace of technological progress continues—and at present there is little reason to think otherwise[9]—the average desktop computer will have the same processing power as the human brain by 2020 and have more processing power than all of humanity by 2050.[10]

The second reason why the authors believe the second machine age is imminent is the nature of digital information. Digital information has two unique economic properties

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1 Eric Brynjolfsson and Andrew McAfee, *The Second Machine Age* (USA: W. W. Norton & Company Inc., 2014) [Brynjolfsson and McAfee].

2 See Ian Morris, *Why the West Rules – For Now: Patterns of History, and What They Reveal About the Future* (New York: Farrar, Straus and Giroux, 2010) [Morris].

3 *Ibid*. Morris defines human social development as consisting of four attributes: energy capture, organization, war-making capability, and information technology.

4 McAfee & Brynjolfsson, *supra* note 1, at 6.

5 *Ibid*.

6 Morris, *supra* note 2, at 497.

7 McAfee & Brynjolfsson, *supra* note 1, at 41.

8 *Ibid*, at 49.

9 Michael Kanellos, "Moore's Law to Roll on for Another Decade," *CNET* (11 Feb 2013), online: <http://www.cnet.com/news/moores-law-to-roll-on-for-another-decade/> archived at <https://perma.cc/HRY7-GSEZ>.

10 Ray Kurzweil, *The Age of Spiritual Machines: When Computers Exceed Human Intelligence* (London: Penguin, 2000).

that give it advantages over other forms of information. First, it is non-rival, meaning that "digital information is not 'used up' when it is used."[11] Second, it costs almost nothing to reproduce quickly.[12] These properties combine to make digital information incredibly useful as a free (or nearly free), precise, and instant resource.[13]

Finally, the authors believe that the second machine age is imminent because it is easier now than ever to combine ideas to innovate. Innovation occurs, the authors contend, not by inventing something new from scratch, but instead by combining existing ideas in a new way.[14] They contend that the best way to encourage innovation is to increase the human capacity to test new ideas.[15] One way to do this is by involving more people in the testing process to increase the probability that a valuable recombinant idea will emerge and, as the McAfee and Brynjolfsson note, "digital technologies are making it possible for ever more people to participate."[16] This phenomenon is known as crowdsourcing and can have impressive results. Organizations ranging from Allstate Insurance to NASA have crowdsourced solutions to problems that they could not solve internally, with solutions often coming from persons whose expertise is well outside the domain of the problem.[17]

Due to exponential growth, digital information and combinatorial innovation, the authors contend that the second machine age will be as transformative of the first one.[18] New computer technologies, they argue, are breaking down barriers in much the same way that mechanical innovations did to create the first machine age: "[c]omputers and digital advances are doing for mental power—the ability to use our brains to understand and shape our environments—what the steam engine and its descendants did for muscle power."[19] As our mental power increases with new technologies, opportunity for progress expands almost inconceivably quickly.

B. AI in the Second Machine Age

The next frontier along the path of blistering technological advance, according to McAfee and Brynjolfsson, is the maturing of the artificial intelligence era. After AI became a formal field in 1956 and AI research programs became established around the world, expectations were high. One prominent AI theorist (and eventual Nobel Laureate) predicted that "machines will be capable, within twenty years, of doing any work a man can do," and another leader in the field declared that "within a generation… the problem of creating 'artificial intelligence' will be solved."[20] However, progress was slow and government funding and interest in AI research plummeted in the mid-1970s, leading to a period known as the "AI winter" that lasted until 1980.[21] After a brief rally in AI interest around expert systems in the early 1980s, a second AI winter set in and funding for research was scarce until the mid-1990s.[22]

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11 McAfee & Brynjolfsson, *supra* note 1, at 62.

12 *Ibid*.

13 *Ibid*.

14 *Ibid*, at 83.

15 *Ibid*.

16 *Ibid*.

17 *Ibid*, at 84-85.

18 *Ibid*, at 7-8.

19 *Ibid*.

20 Daniel Crevier, *AI: The Tumultuous History of the Search for Artificial Intelligence* (New York: Basic Books, 1994) at 109; quoting Herbert Simon and Marvin Minsky, respectively.

21 Tanya Lewis, "A Brief History of Artificial Intelligence", Livescience (4 December 2014), online: <http://www.livescience.com/49007-history-of-artificial-intelligence.html>, archived at <https://perma.cc/8WE5-YQM2>.

22 Pamela McCorduck, *Machines Who Think* 2nd ed (San Francisco: CRC Press, 2004) at 430-435.

Despite its poor record of progress and good reasons for doubt, AI would achieve its greatest successes in the later 1990s and early 21st century. In 1997, an AI program became the first computer world chess champion and in 2011 another AI program called "Watson" won *Jeopardy!*.[23] More recently, AI programs have been behind some of the most cutting-edge developments of the era, including 3D printing and self-driving cars.[24] Given the recent unprecedented period of success in AI, there is reason to believe that the field is less at risk of falling into another AI winter.

McAfee and Brynjolfsson argue that these developments are merely "warm-up acts" to the imminent rise of AI. The authors contend that the exponential, digital and recombinant forces of the second machine age have enabled "two of the most important one-time events in [human] history: the emergence of real, useful artificial intelligence (AI) and the connection of most of the people on the planet via a common digital network."[25] If some of the more recent AI developments seem more amusing than useful (for example, Watson's *Jeopardy!* win), the authors note developing AI technologies that may give key aspects of sight to the visually impaired, restore hearing to the deaf and allow quadriplegics to control wheelchairs with their thoughts.[26]

In addition to useful AI, the authors emphasize the impact of the ongoing shift to connecting billions of people with the world's collective knowledge via mobile phones and networks. As the theory goes, with more human brains accessing information through communication technologies, humanity will generate and exchange more ideas and recombinant innovation will flourish.[27] These two events combined are, to the authors, more important than anything since the industrial revolution and "will make a mockery out of all that came before."[28] If McAfee and Brynjolsson are even half right, then AI technologies will have a major impact on society in the coming decade. The next section of this paper considers what this change will mean for the future of law practice.

II. THE SECOND MACHINE AGE AND LAW PRACTICE

A. Drivers of Change in the Legal Market

Richard Susskind has been thinking and writing about the future of legal practice for decades. In his 2013 book *Tomorrow's Lawyers: An Introduction to Your Future*,[29] Susskind sums up his most recent vision for the future of legal services. In short, he predicts radical change in the next ten years brought about, in part, by emerging technologies.

Susskind identifies three primary drivers of change in the legal market: the "more-for-less" challenge, liberalization in business structures, and information technology.[30] Susskind suggests that information technology is perhaps the most misunderstood and under-appreciated catalyst of change in legal service delivery.[31] He notes that many lawyers believe information technology is overhyped and point to the "dot-com bubble" as an

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23 John Markoff, "Computer Wins on 'Jeopardy!': Trivial, It's Not" *The New York Times* (16 February 2011).

24 McAfee & Brynjolfsson, *supra* note 1, at 90.

25 *Ibid*.

26 *Ibid*, at 92.

27 *Ibid*, at 93-96.

28 *Ibid*, at 90.

29 Richard Susskind, *Tomorrow's Lawyers: An Introduction to Your Future* (United Kingdom: Oxford University Press, 2013) [Susskind].

30 *Ibid*, at 10. The more-for-less challenge describes the increasing pressure on law firms to deliver more legal services for less money. Liberalization refers to the relaxation of laws and regulations that govern who can offer legal services and what types of businesses can offer legal services.

31 *Ibid*.

example.[32] Susskind argues that this perspective misses the larger trend, exemplified by the persistence of Moore's Law, the astounding growth of accessible digital information,[33] and accelerating advances in AI.[34]

B. The New Division of Labour and Moravec's Paradox

One reason technological enthusiasts believe law practice will change soon is because of the compatibility between the abilities of computers and the nature of legal work. Legal work requires intelligence and analytical skills but not necessarily physical capabilities. As it turns out, computers can be programmed to do high-level reasoning relatively easily but struggle mightily with low-level sensorimotor tasks—a principle known as Moravec's paradox.[35] As cognitive scientist Steven Pinker explains:

> The main lesson of thirty-five years of AI research is that the hard problems are easy and the easy problems are hard… As the new generation of intelligent devices appears it will be the stock analysts and petrochemical engineers and parole board members who are in danger of being replaced by machines. The gardeners, receptionists, and cooks are secure in their jobs for decades to come.[36]

Therefore, legal professionals who predominantly use high-level reasoning in their work, rather than nuanced sensorimotor skills, are vulnerable to change brought about by developments in AI.

Second, computers are good at following rules but are bad at pattern recognition. In their 2005 book *The New Division of Labour*,[37] Frank Levy and Richard Murnane explain this now well-publicized insight. The decision-making process regarding whether to provide an applicant with a mortgage, for example, can be expressed in a rule (an algorithm) that includes the mortgage amount and the applicant's financial details. As a result, computers are good at mortgage evaluations. Conversely, the work of scientists or novelists, for example, involves more complex and creative pattern recognition that is difficult to translate into digestible rules for computers.

Arguably, there are many rule-based tasks in legal practice that computers can perform better and more efficiently than humans. One example in practice today is "e-discovery" software, which uses specifically programmed algorithms to determine the relevance of a given set of documents. Perhaps predictably, the legal profession was initially reluctant to give a computer control of a task that could have grave consequences if performed poorly and insisted on having humans do the work of discovery. However, Maura Grossman and Gordon Cormack, in their seminal 2011 article, debunk the myth that manual human review of discovery documents is the most accurate form of review.[38] Instead,

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32 *Ibid*. The "dot-com bubble" was a speculative stock market bubble fueled by growth in the internet sector in the late 1990s. The dot-com bubble collapsed from 1999-2001, resulting in the devaluation or even collapse of many highly-touted and valuable companies.

33 Susskind notes that "…every two days, according to Google's Eric Schmidt, 'we create as much information as we did from the dawn of civilization up until 2003." *Ibid*.

34 *Ibid*, at 13.

35 Hans Moravec, *Mind Children: The Future of Robot and Human Intelligence* (Cambridge, MA: Harvard University Press, 1988) at 15.

36 Steven Pinker, *The Language Instinct* (New York: Harper Perennial Modern Classics, 2007) at 190-91.

37 Frank Levy and Richard Murnane, *The New Division of Labour* (New York: Princeton University Press, 2005) [Levy and Murnane].

38 Maura R. Grossman & Gordon Cormack, "Technology-Assisted Review in E-Discovery Can Be More Effective and More Efficient Than Exhaustive Manual Review" (2011) 17:3 Rich.J.L. & Tech 11 [Grossman and Cormack].

they find that "technology-assisted review can (and does) yield more accurate results than exhaustive manual review, with much lower effort."[39] Other articles further emphasize the cost benefits of e-discovery, which can amount to savings of 70% or more.[40]

Further, as McAfee and Brynjolfsson point out, the acceleration of AI is so rapid that computers are becoming much better at pattern recognition as well. When Levy and Murnane contrasted computers' abilities to follow rules and recognize patterns in 2005, they offered driving a vehicle as an example of complex pattern recognition that is ill-suited for computerization.[41] Their view seemed to be confirmed later that year when a high profile driverless car competition ended with the winning car completing only 5% of the course before crashing.[42] However, just four years later, in October of 2010, Google announced that its autonomous cars had for some time been successfully driving across the United States.[43] What seemed reasonably safe from automation by Levy and Murnane's estimation was achieved only five years after they made their prediction.

The implication then for legal practice is not that all legal work will be automated, but that rule-based, repetitive tasks and even some tasks involving complex pattern recognition are likely to be automated. One example might be an AI system that gives a legal opinion to a client with a personal injury claim. To many practicing lawyers this might seem preposterous given the complex set of variables that go into assessing whether the client has a promising claim and what the value of the claim might be. However, given that AI engineers found a way to manage all the complex variables associated with driving a car safely in traffic, it seems probable that some legal questions such as personal injury claims assessments may also soon be manageable for AI technologies.

C. New Roles for Legal Professionals

The emergence of new legal technologies does not mean that lawyers will become irrelevant. Instead, the roles of legal professionals will shift, rather than disappear, and become more interactive with technological applications in their given field. As McAfee and Bryjolfsson point out, "[e]ven in those areas where digital machines have far outstripped humans, people still have vital roles to play."[44] The game of chess, for example, is a field where computers now dominate in direct competition with humans.[45] However, in "freestyle" chess tournaments, which allow teams to include any combination of human and computer players, the teams of humans and computers (even where the computer partner is relatively basic technology) dominate the most powerful computers.[46] As former World Chess Champion Gary Kasparov described a 2005 freestyle tournament,

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39 *Ibid*.

40 Anne Kershaw & Joe Howie, "Crash or Soar: Will The Legal Community Accept 'Predictive Coding?'" *Law Technology News* (October 2010), online: <https://perma.cc/84KN-4BQD>. See also, Chris Dale, "Having The Acuity to Determine Relevance with Predictive Coding" *e-Disclosure Information Project* (15 October 2010), online: <https://perma.cc/727C-CWVT>.

41 Levy & Murnane, *supra* note 37, at 67.

42 Joseph Hooper, "From Darpa Grand Challenge 2004: DARPA's Debacle in the Desert" *Popular Science* (June 2004), online:<http://www.popsci.com/scitech/article/2004-06/darpa-grand-challenge-2004darpas-debacle-desert> archived at <https://perma.cc/CUW6-9H3V>.

43 Sebastian Thrun, "What We're Driving At" *Google Official Blog* (9 October 2010), online: <https://googleblog.blogspot.ca/2010/10/what-were-driving-at.html> archived at <https://perma.cc/32QM-2USU>.

44 McAfee & Brynjolfsson, *supra* note 1, at 188.

45 D. T. Max, "The Prince's Gambit," *The New Yorker* (21 March 2011), online: <http://www.newyorker.com/reporting/2011/03/21/110321fa_fact_max> archived at <https://perma.cc/VC2T-E3Q5>.

46 McAfee & Brynjolfsson, *supra* note 1, at 188.

"[h]uman strategic guidance combined with the technical acuity of a computer" can produce highly successful outcomes.[47]

The complementary relationship between human and machine is seen in legal practice as well. In e-discovery, for example, though lawyers may not sift through the documents themselves, they remain indispensable to the e-discovery process. As one commentator notes:

> [H]umans will continue to apply their insights and intelligence strategically to guide [e-discovery]. Automated document review technology is a tool like any other with potential that cannot be realized fully without the worldly knowledge and creativity that only humans can bring to bear in solving complex problems.[48]

In such contexts, lawyers' roles shift to become more rooted in collaboration rather than independent problem solving. Arguably this collaboration requires that lawyers have a more advanced and nuanced skillet. As Susskind puts it, "[i]t is more taxing to create a system that can solve many problems than to find an answer to a specific issue."[49] The rewards of the partnership between skilled lawyers and AI are exemplified by the productive capabilities of e-discovery and the legal expert still has much to contribute in an era of increasingly intelligent machines.[50]

III. CAUTIONARY VIEWS ON TECHNOLOGICAL OPTIMISM AND THE IMPACT OF LEGAL TECHNOLOGY

A. Internet-Centrism and Solutionism

Not all commentators on technology share the optimism of McAfee, Brynjolfsson and Susskind. Evgeny Morosov, in his book *To Save Everything, Click Here: Technology, Utopianism, and the Urge to Fix Problems That Don't Exist*, identifies two worrisome trends he calls "internet-centrism" and "solutionism."[51] Internet-centrism is the misguided view that the internet is not just another tool created by humans, but rather the culmination of human invention.[52] This view is problematic because it holds the internet and its associated values of transparency and efficiency as unimpeachable realities, rather than historical peculiarities that are subject to critique.[53]

Solutionism is the habit of exacerbating complex problems by advocating shallow solutions that focus almost exclusively on transparency and efficiency.[54] As one reviewer of Morosov's book summarizes:

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47 Garry Kasparov, "The Chess Master and the Computer," *New York Review of Books* (11 February 2010), online: <http://www.nybooks.com/articles/achives/2010/feb/11/the-chess-master-and-the-computer/> archived at <https://perma.cc/FSS6-CUJB>.

48 Ben Kerschberg, "What Technology-Assisted Electronic Discovery Teaches Us About The Role Of Humans In Technology" *Forbes* (9 January 2012), online: <http://www.forbes.com/sites/benkerschberg/2012/01/09/what-technology-assisted-electronic-discovery-teaches-us-about-the-role-of-humans-in-technology/> archived at <https://perma.cc/B8ET-FMTM> [Kerschberg].

49 Susskind, *supra* note 29, at 111.

50 See also, David Donaldson "Big data useless without human element" *The Mandarin* (9 October 2015), online: <http://www.themandarin.com.au/50786-big-data-useless-without-people/> archived at <https://perma.cc/FX4B-FPGZ>, which emphasizes the importance of human curiosity in making large datasets useful.

51 Evgeny Morosov, "To Save Everything, Click Here: Technology, Utopianism, and the Urge to Fix Problems That Don't Exist (New York: Penguin, 2013).

52 Ellen Ullman, "Big Data is Watching You", *New York Times Sunday Book Review* (17 May 2013).

53 *Ibid*.

54 *Ibid*.

> Solutionism is a kind of technological determinism… the technological solutions available for minor problems… lead us to shallow thinking, and our goals divert from understanding large, complex social problems into writing yet more apps. Worse, we start seeing only problems that can be solved by apps as problems worth solving.[55]

For example, a solutionist might emphasize fitness-related technology as a response to the epidemic of obesity in Western countries, while minimizing or, worse still, delegitimizing socioeconomic and cultural facets to the problem.

If Susskind is right that legal technology will explode in the next decade, then Morosov's principles may be a timely counterpoint to unbridled technological optimism. An internet-centric perspective applied to legal practice could subvert core legal principles like privacy and equality in favour of transparency and efficiency. Although some compromise in traditional legal values may be justified, it should not take place without careful consideration. Solutionism, too, may creep into new legal technology applications with a commercial focus that obscures justice as the ultimate goal of the legal system.

Still, internet-centrism and solutionism are not reasons to turn away entirely from the potential of new technologies. Morosov's perspective is an important reminder to acknowledge the values and potential impacts behind new technology applications. As in all domains that integrate new technology in the second machine age, legal practice should consider the trade-offs. However, the benefits of technological progress are immense and it would be foolish not to explore them further.

B. Constraints on the Adoption of Legal Technology

Beyond Morosov's general critiques of technological progress, other critics take aim at legal technology in particular. Simon Chester is one such critic who spoke at the Pacific Legal Technology Conference in Vancouver, British Columbia in October of 2015.[56] Chester acknowledges that technology is advancing at a blistering pace and that the legal profession will be affected. However, he argues that champions of legal technology, like Susskind, often overlook significant barriers to integrating technology into the legal marketplace.[57] Chester's critiques can be grouped into three categories: technical, economic, and cultural.

i. Technical Constraints

Chester argues that a few technical barriers still limit the implementation of legal technology, in particular AI technologies. Law is messy and, according to Chester, it is difficult to construct algorithms that capture the law in a useful way.[58] Unlike in the medical field, Chester notes, answers to legal questions can vary greatly depending on the relevant jurisdiction.[59] Few legal problems have clear yes or no answers.

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55 *Ibid*.

56 Mr. Chester is a lawyer at Gowlings in Toronto. His career spans law teaching, a decade in government and thirty years in private practice on Bay Street. He has been a pioneer in applying advanced technology in legal practice and has chaired the American Bar Association TechShow. See Slaw.ca "About Simon Chester" (19 November 2015), online: <http://www.slaw.ca/author/simon-c/> archived at <https://perma.cc/X3RE-6JM3>.

57 Simon Chester, "How Tech is Changing the Practice of Law: Watson, AI, Expert Systems, and More" (Debate presented at the Pacific Legal Technology Conference, Vancouver, 2 October 2015). [Chester].

58 *Ibid*.

59 For this reason, Chester believe that emerging AI technologies will have much greater impact in fields that better transcend local peculiarities, like medicine and finance.

Others have noted the complexity of legal reasoning as a potential barrier to implementing effective legal technologies. One argument is that legal reasoning is an inherently "parallel process" in which "the answer to one question may change which questions are subsequently asked."[60] This difficulty, some contend, significantly disrupts the ability to have computers deliver useful answers to legal questions.

Another technical constraint, Chester argues, is that AI machines will struggle to access relevant legal information because major legal publishers are unlikely to give away expensive materials to which they have propriety, and law firm data is restricted by confidentiality obligations. As Chester analogizes with reference to IBM's supercomputer Watson: "Watson needs fuel to run, but the [gas stations] are closed."[61] If he is right, then integrating legal technology into the marketplace will likely take longer than many predictions contend.

Chester's technical critiques of implementing legal technology are unconvincing. Though few legal problems have straightforward answers, this does not mean that AI technologies cannot be used effectively in law. Where problems are complex, with few simple yes or no answers, AI programmers can still find ways to better input the data needed for the AI system to be effective.[62] For example, reviewing documents for discovery is not a process with simple yes or no answers, and the unique context of the case often determines the degree of relevance for each document. Still, e-discovery technicians use various methodologies to program e-discovery systems to be sensitive to the subtleties of a specific case[63] and, in doing so, achieve better results than human-only discovery processes.[64]

AI can also manage the difficulties posed by the nature of legal reasoning as a parallel process. While legal reasoning often requires modifying the original question based on answers received, this reasoning can be represented in computers in a decision-tree model.[65] Many expert systems employ this capability, modifying subsequent questions posed according to previous answers. For example, AI processes called "neural networks" have been used in this way for at least two decades[66] and are at the forefront of current AI applications such as self-driving cars.[67]

Chester overstates the inaccessibility of legal information for AI machines. Far from protecting their data from AI technologies, major legal publishers are more likely to use new technologies for their own benefit. For example, Thomson Reuters, a leading provider research information for lawyers and other professionals, announced its partnership with

60 Michael Aikenhead, "The Uses and Abuses of Neural Networks in Law" (1996) 12 Stanta Clara Computer & High Tech. L.J. 31 at 56.

61 *Ibid*.

62 Kerschberg, *supra* note 48.

63 *Ibid*.

64 Grossman & Cormack, *supra* note 38.

65 John Zeleznikow & Daniel Hunter, *Building Intelligent Legal Information Systems – Representation and Reasoning in Law*, ch. 6 (1995) Computer Law Series No. 13, 1986 at 118-25; See generally Alan Tyree, *Expert Systems in Law* (Sydney, Australia: Prentice Hall, 1989) for a discussion of the use of logic and tree diagrams in representing laws.

66 Trevor Bench-Capon, *Neural Networks and Open Texture*, 4th International Conference on Artificial Intelligence & Law 292 (1993).

67 Ben Firner, "End-to-End Deep Learning for Self-Driving Cars" (17 August 2016), online: <https://devblogs.nvidia.com/parallelforall/deep-learning-self-driving-cars/> archived at <https://perma.cc/43PY-CF8N>.

IBM in October of 2015 to explore Watson's analytic potential in key industries.[68] Of the partnership, IBM Watson senior vice president noted the "incredible opportunity to combine Watson's cognitive capabilities with… [Thompson Reuter's] vast trove of data."[69] Given the demonstrated willingness of "big players" to engage technology with their collection of legal data, there is currently little reason to think that data accessibility will be a significant barrier to effective legal technology.

ii. Economic Constraints

Chester's second barrier to the rise of technology in law practice is economic. He points out that the market for legal technology, by which he means legal service providers who might invest in legal technology, is relatively small[70] and will struggle to attract technologically innovative developers when larger markets (such as healthcare and financial services) have more potential for profit. Further, the legal services market is fragmented, with 65 jurisdictions in North America alone, and under-capitalized, with few "big players" willing to develop and implement new legal technologies.[71] These economic forces, Chester argues, will significantly delay the impact of technology on legal practice.

Though the economic barriers identified by Chester are not entirely unfounded, they are only likely to impact the development of legal technology in the short term. It is difficult to know the size of the Canadian legal market as recent reports have highlighted the presence of latent demand for legal services.[72] If new legal technologies are able to access the latent demand by lowering the cost of legal services, then the legal market may indeed be larger and more profitable for technology developers than current economic indicators suggest. Further, it is not clear that market fragmentation or under-capitalization will be barriers to legal technology development beyond the short term. Contrary to Chester's suggestion, there are "big players" taking a lead in legal technology. Aside from the recent Thompson Reuters and IBM partnership, the world's largest law firm, Dentons, is utilizing an advanced AI legal software developed out of the University of Toronto,[73] while global mega-firm Norton Rose Fulbright is experimenting with software called Noeta Logic and other new technology applications.[74] Given the willingness to experiment, especially in a legal industry overdue for innovation, it is difficult to see how Chester's economic barriers will have significant impact beyond the next few years.

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68 Thomson Reuters Press Release, "Thomson Reuters and IBM Collaborate to Deliver Watson Cognitive Computing Technology" (8 October 2015), online: <http://thomsonreuters.com/en/press-releases/2015/october/thomson-reuters-ibm-collaborate-to-deliver-watson-cognitive-computing-technology.html> archived at <https://perma.cc/Y9R4-K7RW>.

69 *Ibid*.

70 Chester, *supra* note 57. Chester notes that the market for legal service providers is slightly smaller than the market for online travel services and that Microsoft recently hired its first full-time legal market representative.

71 *Ibid*.

72 Canadian Bar Association, "The Future of Legal Services in Canada: Trends and Issues" *CBA Legal Futures Initiative*, online: <http://www.proselex.net/Documents/The%20Future%20of%20Legal%20Services.pdf> archived at <https://perma.cc/YZA3-YCMQ> at 22 [Canadian Bar Association].

73 Jeff Gray, "U of T students' artificially intelligent robot signs with Dentons law firm" *The Globe and Mail* (9 August 2015), online: <http://www.theglobeandmail.com/report-on-business/industry-news/the-law-page/u-of-t-students-artificially-intelligent-robot-signs-with-dentons-law-firm/article25898779/> archived at <https://perma.cc/XF3H-VMD9>.

74 Charles Christian, "NRF to roll out Neota Logic as innovation takes hold" *Legal IT Insider* (October 2015), online: <http://www.legaltechnology.com/wp-content/uploads/2015/11/Insider287.pdf> archived at <https://perma.cc/K2BC-82TG>.

iii. Cultural Constraints

Chester's strongest argument is that the culture of legal practice will slow the pace of integration well beyond the predictions of legal technology optimists. Chester predicts that change in the legal profession takes ten times as long and be ten times as expensive as industry experts predict, but once it occurs, the change will be twice as effective as predicted.[75] While Chester's argument draws only on his experience engaging with legal technology in over forty years in the Canadian legal services industry,[76] others have independently corroborated the lack of openness to change in the Canadian legal culture. For example, in an address titled "The Legal Profession in the 21st Century," Chief Justice Beverley McLachlin noted that the conservative Canadian legal culture is a key impediment to progress in the profession.[77] If Chester is right, then the dramatic change in the coming decade predicted by legal futurists like Susskind may be further off than forecasted.[78]

There are reasons to believe that the culture in the legal profession will significantly delay the integration of legal technology. Arguably, most of the legal profession is largely ignoring legal technology or engaging it in a merely symbolic sense in order to reassure clients.[79] Even those who earnestly engage legal technology seem to only want to digitize current workflows, or in other words, to "pave the cow path." Stephanie Kimbro, a fellow at Stanford Law School and a pioneer in Virtual Law Practice, writes that expert systems are tools primarily used to "assist in the decision-making process for lawyers."[80] Only secondarily does she recognize potential for experts systems to be client-facing, and even then, only "as a preventative or educational resource.[81] Kimbro's focus on lawyer-centric applications misses the more promising possibility that new technology applications could better increase access to justice by enabling clients to solve their own problems, without consulting expensive legal experts. Arguably, her perspective reflects the inward-focused culture of law practice, which severely restricts the transformative potential of technology in the legal services industry.[82]

Clayton Christiansen's book *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*[83] helps explain why the legal services industry continues to view new technology applications only as efficiency tools, rather than as a means to work differently altogether. Christiansen explains that companies tend to innovate at the highest tiers of their market because profits are traditionally best achieved "by charging the highest prices

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75 Chester, *supra* note 57.

76 For Chester's biography, see Pacific Legal Technology Conference, Speakers, online: <http://www.pacificlegaltech.com/speakers.html> archived at <https://perma.cc/QPA3-5DN7>.

77 Chief Justice Beverley McLachlin, "The Legal Profession in the 21st Century" (Paper delivered at Canadian Bar Association Plenary, Calgary, 14 August 2015) at 3.

78 Susskind, *supra* note 29, at 82. Susskind predicts that by about 2020 all substantial and successful legal businesses will be "converting their business processes from human handcrafting to ever more sophisticated and intelligent IT-based production."

79 *Ibid*, at 79, refers to this as the "denial" stage, where most major legal services providers are hoping that the legal market will reset to 2006 when many law firms had more non-price-sensitive work than they could handle.

80 Stephanie Kimbro, "Using Technology to Unbundle in the Legal Services Community" (February 2013), Harvard Journal of Law and Technology, online: <https://ssrn.com/abstract=2233921> archived at <https://perma.cc/9WS6-M6YZ> at 19.

81 *Ibid*.

82 For example, by orienting new technology to help lawyers do their work, it precludes the possibility the new technologies might allow some legal work to be done without lawyers. This keeps lawyers involved and keeps costs high, thereby limiting the impact of new technologies and access to justice.

83 (Boston, MA: Harvard Business School Press 1997).

to the most demanding and sophisticated customers at the top of market."[84] However, this strategy, called "sustaining innovation," is vulnerable to "disruptive innovation," which gives "a whole new population of consumers at the bottom of a market access to a product or service that was historically only accessible to consumers with a lot of money or a lot of skill."[85] Typically, disruptive innovation strategies are not attractive to successful businesses because, at least initially, these strategies often have lower gross margins, smaller target markets, and simpler products that score lower on traditional performance metrics than sustaining innovation strategies.[86]

When applied to the legal services industry today, Christiansen's ideas are illuminating. By Christansen's theory, well-established, traditional law firms are more likely to pursue profits at the high end of the legal market by incrementally improving services for sophisticated, non-price-sensitive customers. This sustaining innovation strategy has worked for big firms for many years now and, over time, the legal industry has developed a cultural bias against change. Until a big firm breaks rank and demonstrates the transformative potential of legal technology there will be little to challenge the cultural stubbornness. As Susskind puts it, "it will be hard to convince a group of billionaires that their business model is broken."[87]

Although, the culture of sustaining innovation in the legal services industry opens the door for other innovators to use technology to provide legal services to the bottom end of the market, this endeavour is likely unappealing to traditional firms given that the market is undeveloped and risky. As Christiansen states, "discovering markets for emerging technologies inherently involves failure, and most individual decision makers find it very difficult to risk backing a project that might fail because the market is not there.[88] Christiansen's framework helps explain the resistance to change in the legal profession[89] and supports Chester's argument that the legal culture will delay the integration of new technologies, at least from within the traditional legal market.

Chester's argument, however, underemphasizes the pressure that non-traditional legal service providers will put on mainstream legal culture. As Nate Thompson, another speaker at the Pacific Legal Technology Conference, responded to Chester's cultural argument, "[t]he change is likely to come from outside the profession and it will surround us from the outside."[90] Once surrounded, the traditional legal service providers would have little choice but to embrace technological change more fully. As a recent Canadian Bar Association (CBA) "Futures Report" posits:

> Choosing to adopt the newest forms of technology may not be an option for most lawyers and firms in the future. An entire generation has expectations that service providers will conduct business in a way to which they have become accustomed—quickly, directly, and online.[91]

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84 Clayton Christensen, Key Concepts: Disruptive Innovation, online: <http://www.clayton christensen.com/key-concepts/> archived at <https://perma.cc/6A6T-YU6A> [Christensen].

85 *Ibid*

86 *Ibid*.

87 Susskind, *supra* note 29, at 56.

88 Christensen, *supra* note 86, at 158.

89 Commentators on change resistance in the legal profession often note that where a medical office today would be unrecognizable to a doctor from 200 years ago, a lawyer from the 1800s would be relatively comfortable in a modern courtroom. See George J Annas, "Doctors, Patients, and Lawyers – Two Centuries of Health Law" (2012) 367 *New England Journal of Medicine* 445-50 at 445.

90 Nate Thompson, "How Tech is Changing the Practice of Law: Watson, AI, Expert Systems, and More" (Debate presented at the Pacific Legal Technology Conference, Vancouver, 2 October 2015).

91 Canadian Bar Association, *supra* note 72, at 29.

Put in Christiansen's terms, while traditional law firms may insist on pursuing sustaining innovation strategies, outsides with less to lose will adopt a disruptive approach and force traditional firms to reconsider their strategy.

There has been a boom of legal technology start-ups in recent years coming from outside the traditional legal industry and 'disruption innovation' is already underway.[92] LegalZoom and Rocket Lawyer are two examples of legal services providers who started by servicing the low-margin end of the market and have gradually inched their way up.[93] They were allowed to do so because, at first, they were not competing with lawyers but instead serving an abandoned portion of the market, namely low-income customers who cannot afford traditional legal services.[94] Now LegalZoom and Rocket Lawyer are competing with traditional lawyers and the legal community has taken notice, most aggressively by trying to have the LegalZoom deemed an unauthorized practice of law.[95] Importantly, LegalZoom and Rocket Lawyer were not products of the conservative mainstream legal culture, but rather disruptive innovators from the fringes who crept into prominence in spite of the conservative mainstream legal culture.

There are some signs that the mainstream legal culture is ready to shift. As noted, major players in the legal services marketplace, including Dentons, Norton Rose Fulbright, and Thompson Reuters are investing in product innovation in unprecedented ways. Demographic trends caused by aging lawyers are likely to rapidly alter the makeup and culture of traditional firms.[96] The incoming cohort of lawyers set to take leadership positions are more tech savvy and more comfortable outside of the structure of the traditional firm.[97] This may further increase the willingness of big firms to embrace change and new ways of practicing.

CONCLUSION

Most commentators on legal technology only argue about when and how technology will transform legal practice, not whether it will be transformed. Lawyers, especially young lawyers, should be alert to the possibilities legal technology enable. If Susskind is right, then in the future most legal professionals will be working much closer with computers than we do with clients (if that is not true already). As futurist Kevin Kelly puts it, "[y]ou'll be paid in the future based on how well you work with robots."[98]

While skepticism about long-term predictions is warranted, critiques of legal technology are often overstated and reactionary. Susskind calls these critiques "irrational rejectionism," which he defines as "the dogmatic and visceral dismissal of a technology with which the skeptic has no direct personal experience."[99] In a world with so many

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92 Basha Rubin, "Legal Tech Startups Have a Short History and a Bright Future" *TechCrunch* (6 December 2014), online: <http://techcrunch.com/2014/12/06/legal-tech-startups-have-a-short-history-and-a-bright-future/> archived at <https://perma.cc/Y5D5-ASVE>.

93 Ben Barton "Lessons From the Rise of LegalZoom" *Bloomberg BNA* (18 June 2015) online: <https://bol.bna.com/lessons-from-the-rise-of-legalzoom/> archived at <https://perma.cc/DH3X-CVNQ>.

94 *Ibid*.

95 Terry Carter "LegaZoom hits a legal hurdle in North Carolina" *ABA Journal* (19 May 2014), online: <http://www.abajournal.com/news/article/legalzoom_hits_a_hurdle_in_north_carolina> archived at <https://perma.cc/2KJT-HFKS>.

96 Canadian Bar Association, *supra* note 72, at 31.

97 *Ibid*, at 25-26.

98 Kevin Kelly, "Better than Human: Why Robots Will—and Must—Take Our Jobs", *Wired*, (24 December 2012), <https://www.wired.com/2012/12/ff-robots-will-take-our-jobs/>, archived at <https://perma.cc/CAC6-HRZF>.

99 *Ibid*, at 12.

new technologies that rise and fall so quickly (for example, Twitter going from obscurity to 300 million users in three years),[100] it is understandable that people are skeptical of technologies, especially those perceived as threats to their livelihoods. Still, much evidence points towards imminent change.

Given the trends in technology, it is difficult to foresee anything other than a significant shift in how legal services are delivered. As Susskind submits, "[i]t is simply inconceivable that information technology will radically alter all corners of our economy and society and yet somehow legal work will be exempt from any change."[101] Though Morosov and Chester give good reasons to reign in careless technological optimism, it appears that legal technology will have a major impact sooner rather than later. Culture may yet have some impact in slowing the integration of legal technology, but at some point the mainstream culture will be overwhelmed by those at the margins who are willing to react to market pressures and remodel the delivery of legal services.

100 *Ibid*.
101 *Ibid*, at 6.