

Introduction

Society is undergoing a digital transformation as artificial intelligence and other technologies are developed to optimize decision making and operational performance. Digital transformation has been described as the use of technology to improve the performance or reach of an enterprise,¹ or the radical rethinking of how an organization uses technology, people and processes to fundamentally change business performance.² Fundamentally, digital transformation implies integrating new tools and technologies which rely on digital data into all areas of a business, thereby changing the way the business functions. Microsoft CEO, Satya Nadella, has described the process of digital transformation as four pillars that focus on the long-term benefits of digital technologies: empowering employees, engaging customers, optimizing operations, and transforming product or business.³

Although there are a variety of tools and technologies⁴ that can be applied to advance digital transformation, this paper will focus on artificial intelligence (“AI”), including machine learning, and will highlight some contract, tort, and regulatory law issues for legal counsel in the energy industry to consider when advising on appropriate risk management strategies.

As a naturally data-driven industry, the energy sector stands to be revolutionized by AI. Data analytics, autonomous machines, vessels, and vehicles are but a few of the ways that the power of AI can be leveraged for improved corporate performance and efficiencies. Other applications include predicting equipment performance and maintenance requirements, modelling impacts of various strategies and actions, and making recommendations based on real time data and events. While the use of AI technology brings great promise, it also introduces unknowns to the legal landscape.

AI as part of the Digital Transformation

Competitive advantage, through digitization or otherwise, has three dimensions: by producing more at lower cost (scale), by achieving a greater production variety (scope), and by pushing for improvement and innovation (learning).⁵ AI technologies can help achieve scale, scope and learning results in the energy industry with operational efficiencies mostly likely achieved through impacts on scale and learning.

The practical importance of the digital transformation and the need to leverage AI and other technologies in operations is certainly appreciated in industry. A recent survey of board members and senior executives found that technology risk was their primary concern in 2019. This risk factor surged to the top spot, up

¹ George Westerman, Didier Bonnet & Andrew McAfee, “The Nine Elements of Digital Transformation” (07 January 2014), online: *MIT Sloan Management Review* <<https://sloanreview.mit.edu/article/the-nine-elements-of-digital-transformation>>.

² Clint Boulton, “What is digital transformation? A necessary disruption” (31 May 2019), online: *Chief Information Officer* <<https://www.cio.com/article/3211428/what-is-digital-transformation-a-necessary-disruption.html>>.

³ Alex Sessoms, “Making Sense of Digital Transformation” (15 September 2016) online: *Microsoft Partner Network* <<https://blogs.partner.microsoft.com/mpn/making-sense-of-digital-transformation>>.

⁴ For example, 3D printing technologies and blockchain represent digitization of previous manual tasks based on non-digital data and information.

⁵ Marco Iansiti & Greg Richards, “Coronavirus Is Widening the Corporate Digital Divide” (26 March 2020), online: *Harvard Business Review* <<https://hbr.org/2020/03/coronavirus-is-widening-the-corporate-digital-divide>>.

from being listed in tenth place in the same survey a year prior.⁶ However, transformation poses significant challenges. Large energy companies with long histories, extensive operations, legacy infrastructure, and workplace dynamics that might be resistant to change, may find it particularly difficult to adapt at the pace required.⁷ Resistance to change may also be a significant risk factor in the energy industry specifically, considering that a large percentage of these organizations currently use dated, legacy systems, processes and practices.⁸ Even where the transition to, and use of, digital technologies is embraced by an organization, the successful adoption of digital technologies likely requires new talent or significant efforts to upskill or reskill existing talent.⁹

Many corporations are only at the beginning of their journey toward digital transformation. Researchers have created a digital transformation (“DT”) maturity model that scores corporations based on their use, attitude towards, and acceptance of the newest technologies. The DT maturity model has five stages of maturity: 1) promote and support; 2) create and build; 3) commit to transform; 4) user-centred and elaborated processes; and 5) data-driven enterprises.¹⁰ Despite the various benefits of embracing DT, the creators of the maturity model suspect that only 1% of corporations are in the fifth and most mature stage, while the majority of corporations are between the second and third stage.¹¹ While this model and the results are not industry specific, it seems reasonable to assume that these results would translate approximately to the energy industry.

The current global COVID-19 pandemic has put in sharp focus the need for corporations to embrace digital transformation. A March 2020 article from Harvard Business Review states that we are seeing the most rapid organizational transformation in the history of the modern firm as employees work from home, schools shift to online delivery and restaurants transition to online ordering.¹² The necessity of DT within the energy sector is particularly acute in light of depressed market prices currently facing the sector and the prospect of another round of cost cutting and downsizing. Operational flexibility and efficiency seem more urgent now than ever, making DT not just a tool to optimize performance, but instead one that must be harnessed simply to ensure survival.

What is Artificial Intelligence?

Technologies such as AI, 3D printing and the internet of things are being heralded as the “fourth industrial revolution” because these technologies continue to rapidly merge with humans’ physical lives. These changes are altering how individuals, companies and governments operate, ultimately leading to a societal transformation similar to previous industrial revolutions.¹³

⁶ Protiviti and NC State University’s Enterprise Risk Management Initiative, “Executive Perspectives on Top Risks for 2019” (2019), online: *Protiviti* <https://www.protiviti.com/sites/default/files/united_states/insights/nc-state-protiviti-survey-top-risks-2019.pdf> [“**Protiviti 2019**”].

⁷ Protiviti and NC State University’s Enterprise Risk Management Initiative, “Executive Perspectives on Top Risks for 2020” (2020), online: *Protiviti* <<https://www.protiviti.com/CA-en/insights/protiviti-top-risks-survey>>.

⁸ *Ibid.*

⁹ Protiviti 2019, *supra* note 6.

¹⁰ Sabine Berghaus & Andrea Back, “Stages in Digital Business Transformation: Results of an Empirical Maturity Study” (September 2016), online: *Association for Information Systems* <<https://aisel.aisnet.org/cgi/viewcontent.cgi?article=1022&context=mcis2016>>.

¹¹ *Ibid.*

¹² Iansiti, *supra* note 5.

¹³ Klaus Schwab, *The Fourth Industrial Revolution* (New York, NY: Crown Publishing Group, 2016).

Once thought to be a concept of science fiction, AI has become a relatively common technology with countless applications. However, AI is not a term of art and has no universally accepted definition.¹⁴ Professor John McCarthy of Stanford University, who is sometimes considered to be the father of AI, coined the term in 1956. He explained AI as follows:

“It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable.”¹⁵

The English House of Lords preferred the following definition:

“Technologies with the abilities to perform tasks that would otherwise require human intelligence, such as visual perception, speech recognition, and language translation”.¹⁶

However defined, the basis of any system that might qualify as AI is a series of complex algorithms (sequences of instructions to convert an input into an output) that allow large amounts of data to be processed and the drawing of correlations, conclusions and predictions from same.¹⁷ The ultimate goal when developing AI is to create a computer program that can solve problems and perform cognitive tasks as well as, or better than, humans. However, a machine may still have AI even if it falls short of this lofty goal.¹⁸

There is academic debate about the appropriate threshold or test for AI. In 1950, the famous mathematician Alan Turing outlined the “Turing Test” to determine whether a machine is intelligent.¹⁹ The Turing Test involves three participants, a human, a machine, and an interrogator. The interrogator, who is isolated from the human and the machine, is allowed to ask both parties questions over text. Based on their responses, the interrogator must guess which participant is the machine. If the machine can fool the interrogator, then it is considered intelligent. However, Professor McCarthy considers the Turing Test to be one sided. A machine that passes the test is definitely intelligent, but a machine can still be intelligent without being able to imitate humans.²⁰ Therefore, in Professor McCarthy’s opinion the threshold for AI is lower than the requirements of the Turing Test.

AI is fundamentally a prediction technology in that it allows for predictions to be made and, in many instances, automatically acted upon. The economic shift that is anticipated to come with the proliferation of AI will center around the drop in the cost of prediction.²¹ As the cost of prediction falls, not only will

¹⁴ Paulius Cerka, Jurgita Grigiene & Gintare Sirbikyt, “Liability for Damages Caused by Artificial Intelligence” (2015) 31 Computer Law & Security Review 376.

¹⁵ John McCarthy, “What is artificial intelligence?” (12 November 2007), online: *Stanford University* <<http://jmc.stanford.edu/articles/whatisai/whatisai.pdf>>.

¹⁶ House of Lords, “AI in the UK: ready, willing and able?”, HL Paper 100, 16 April 2018 at 14

¹⁷ Marta Infantino & Weiwei Wang, “Algorithmic Torts: A Prospective Comparative Overview” (2019) 28 Transnational Law & Contemporary Problems 309 at 312-13 & 316.

¹⁸ McCarthy, *supra* note 15.

¹⁹ Alan Turing, “Machine Computing and Intelligence” (1950) 59 Mind Issue 236 433 online: Oxford Academic <<https://academic.oup.com/mind/article/LIX/236/433/986238>>.

²⁰ McCarthy, *supra* note 15.

²¹ Ajay Agrawal, Joshua Gans & Avi Goldfarb, “The Simple Economics of Machine Intelligence” (17 November 2016), online: *Harvard Business Review* <<https://hbr.org/2016/11/the-simple-economics-of-machine-intelligence>>.

activities that were historically prediction-oriented become cheaper – like inventory management and demand forecasting – but prediction will also be used to solve new problems.²²

In the energy industry, machine learning and data science will be the prominently utilized techniques and technologies of AI. Machine learning is a subset of AI. The fundamental characteristic of machine learning, is that it allows computer programs to modify their responses as they accumulate more data.²³ The program “learns” from its own prior actions as well as the data it has accumulated independent of the designer, programmer or user.

Data science is not properly considered a subset of AI, but instead, is a field of study that uses AI to “extract information and insights from data, using neural networks to link related pieces of data together and form more comprehensive pictures from existing information”.²⁴ “Data analytics” is a term often used to describe the process and its use in predictive forecasting. While most organizations are drenched in data, the organizations that succeed are those that most quickly use data to adapt to the insights provided in that data.²⁵ One illustration of data analytics in oil and gas operations is the examination of the voluminous and complex data used for oil and gas exploration and production, which makes that data more accessible, and allows companies to discover new exploration opportunities or make better use of existing infrastructures.²⁶

Applications in the Energy Industry

AI and the energy sector are becoming increasingly interconnected. It is anticipated that AI will revolutionize the way we produce, transmit and consume energy and can also be leveraged to limit the industry’s environmental impact.²⁷ Outlined below are just some of the many applications of AI that are already being implemented in the energy industry.

Failure Prediction and Prevention

Using artificial intelligence to monitor equipment in order to predict and detect failure, as well as to detect and schedule maintenance as required and at maximum efficiency, is a common and effective AI application. Human intervention requires constant inspection of equipment, whereas the application of artificial intelligence can instantaneously process and utilize round-the-clock sensor data. AI has nearly endless applications in this respect, for example, in a plant environment, on major pieces of operating equipment (shovels, trucks, wells), and on transmission lines to predict system overloads and warn

²² *Ibid.*

²³ Mariette Awad & Rahul Khanna, *Efficient learning machines: theories, concepts, and applications for engineers and system designers* (Berkley, CA: Apress, 2015).

²⁴ Celestine Roberts, “How AI is Keeping Critical Infrastructure Safe During COVID-19” (31 March 2020), online: *Submar* <<https://submar.com/how-ai-is-keeping-critical-infrastructure-safe-during-covid-19/>>.

²⁵ Jonathan Cornelissen, “The Democratization of Data Science” (27 July 2018), online: *Harvard Business Review* <<https://hbr.org/2018/07/the-democratization-of-data-science>>.

²⁶ Umar Ali, “Exploring the Impact of Artificial Intelligence on Offshore Oil and Gas” (15 May 2019), online: *Offshore Technology* <<https://www.offshore-technology.com/features/application-of-artificial-intelligence-in-oil-and-gas-industry>>.

²⁷ Franklin Wolfe, “How Artificial Intelligence Will Revolutionize the Energy Industry” (28 August 2017), online: *Harvard University* <<http://sitn.hms.harvard.edu/flash/2017/artificial-intelligence-will-revolutionize-energy-industry/>>.

operators of potential transformer breakdowns.²⁸ When used properly, predictive maintenance technologies can greatly improve safety, while also reducing downtime and maintenance costs.

For example, ExxonMobil uses predictive maintenance to evaluate upstream, midstream and downstream assets through the use of sensors that capture data on equipment condition. This data is then analyzed to ensure optimal performance and detect potential failures. ExxonMobil has partnered with Microsoft to take advantage of its Azure cloud computing platform and data analytics tools that collect real-time data from the corporation's oil field assets with the intent of preventing incidents through advanced detection and repair.²⁹

Digital Twin Technology

Digital twin technology is being increasingly adopted across industries, including the energy sector. A digital twin is a digital representation of a physical asset, process or system, including the engineering information that allows us to understand and model the performance of that asset.³⁰ Digital twins are advancing beyond building information modeling to enabling organizations to converge their engineering, operational, and information technologies for immersive visualization and analytics visibility.³¹ This can allow an organization to monitor key performance indicators in finite detail, thereby optimizing the operation and maintenance of physical assets, systems and processes. In addition to monitoring existing conditions, digital twin technology also has the ability to simulate operating parameters which can impact decision-making processes.³² This feature can be especially useful for predictive maintenance to extend the life of an ageing asset.³³

BP, for example, has created a highly-sophisticated simulation and surveillance system called APEX, which creates virtual models of all BP production systems. APEX permits engineers to use real-time data to optimize the performance of assets, including offshore assets, by assessing the impact of their operational decisions with the digital twin.³⁴ Shell Chemical has also used digital twin technology to evaluate the construction of a large project in the United States. Twice weekly, Shell used drones to capture 3D images for reality modeling of the plant as it was being constructed. This permitted the construction team and other stakeholders to use the digital twin to monitor progress and identify any issues.³⁵

²⁸ "How Artificial Intelligence is Powering the Energy Industry" (29 July 2019), online: *Cognillo* <<https://www.cognillo.com/blog/artificial-intelligence-powering-energy-industry/>>.

²⁹ "Opportunities and Challenges of Artificial Intelligence in the Energy Sector" (4 February 2020), online: *Intellias* <<https://www.intellias.com/opportunities-and-challenges-of-artificial-intelligence-in-the-energy-sector/>>.

³⁰ Anne-Marie Walters, "How Digital Twins Will Drive Innovation in the Energy Sector" (7 March 2019), online: *Bentley* <<https://www.bentley.com/en/perspectives-and-viewpoints/topics/viewpoint/2019/ps-digital-twins-energy-sector>>.

³¹ Jonah Baker, "Digital twins are propelling the oil and gas industry into the future of asset optimisation" (15 May 2020), online: *NS Energy* <<https://www.nsenergybusiness.com/features/digital-twins-oil-gas/>>.

³² *Ibid.*

³³ Andrew Young, "Life Extension through Predictive Maintenance" (5 January 2019), online: *Hart Energy* <<https://www.hartenergy.com/exclusives/life-extension-through-predictive-maintenance-179799>>.

³⁴ Baker, *supra* note 31.

³⁵ Aditya Chaturvedi, "Digital Twin, AI to drive innovation in energy sector" (27 March 2019), online: *Geospatial World* <<https://www.geospatialworld.net/blogs/digital-twin-ai-to-drive-innovation-in-energy-sector/>>.

Connecting the Lone Worker

AI also offers many solutions to connect a lone worker to a support team in another location. There are now devices that can be worn by a lone worker to permit a support team in another location to see exactly what the lone worker is seeing and doing and/or speak to the worker to provide specific instructions in real time. The technology acts as worker support (for example, information access in the field to drawings) and reduces travel time and costs for the entire support team. It also increases the ability of low skilled workers to perform skilled tasks because they have the real time support of subject matter experts in another location.

The application of next-generation Industrial Internet of Things (referred to as IIOT) technology, such as cloud-based, mobile or wireless monitoring solutions, can also relay essential information about a worker's location, biometric data about the worker (including fatigue monitoring) and the presence of dangerous gases back to a support team.³⁶ In addition to improving productivity, this technology significantly enhances safety in the field.

Automation and Robotics

The deployment of autonomous robots and vehicles, including autonomous heavy haul vehicles, to perform work is another significant opportunity for the energy industry. Autonomous robots are able to carry out inspections on equipment or infrastructure, analyze data and make logical decisions. An obvious benefit of this approach is the ability to remove workers from potentially dangerous tasks and use robotics technology instead. Minimizing geographical remoteness of workers and the costs associated therewith is another opportunity presented by this type of AI application.

An example of the use of this aspect of AI in the energy sphere is the widely reported use of self-driving haul trucks by major oil sands operators, including Canadian Natural, Suncor Energy and Imperial Oil.³⁷ The case for deployment of an autonomous haulage system is that it enables efficiencies, while also improving safety and reducing collisions. The depressed conditions currently facing the energy market have actually caused Suncor to accelerate the rollout of autonomous trucks as it will further reduce costs.³⁸

Legal Considerations

Contract Law Considerations

³⁶ Ken Schmidt & Brent Moore, "No Worker Left Behind: Protecting Lone Workers in the Oil and Gas Industry" (12 June 2017), online: *EHS Today* <<https://www.ehstoday.com/safety/article/21919068/no-worker-left-behind-protecting-lone-workers-in-the-oil-and-gas-industry>>.

³⁷ Vincent McDermott, "Imperial plans deployment of seven automated trucks by year's end, CNRL to start pilot in 2019" (31 July 2018), online: *Fort McMurray Today* <<https://www.fortmcmurraytoday.com/news/local-news/imperial-plans-deployment-of-seven-automated-trucks-by-years-end-cnrl-to-start-pilot-in-2019>>.

³⁸ Paul Moore, "Suncor speeds up Komatsu 980E fleet automation at Fort Hills to reduce costs" (2 June 2020), online: *International Mining* <<https://im-mining.com/2020/06/02/suncor-speeds-komatsu-980e-fleet-automation-fort-hills-reduce-costs/>>.

A number of distinct considerations arise when drafting contracts for the purchase and sale of AI technologies and products incorporating AI. Such contracts seek to transfer property rights and allocate related risks. In the AI context, two of the more critical and difficult issues to be considered will be defining the scope of rights being acquired, and what terms as to performance risks might be implied in the sale or license of the AI technologies or products incorporating AI.

Due the nature of AI systems, determining the precise rights of the acquirers/users of such technology has some unique challenges and implications. For example, in purchasing an autonomous vehicle or other machine incorporating AI, the buyer may expect to purchase rights amounting to total ownership. However, the AI system incorporated in order to give the vehicle its autonomous nature may be subject to a variety of intellectual property rights that are not conveyed and may not always be apparent to the energy company as the end user. Similarly, ownership of the work product and the data gathered by the AI program in operation may not be clear.

Where not incorporated into a physical product like an autonomous vehicle, AI technology is generally software based and acquired in a licensing structure. The nature of a license to an AI technology implies that any interests in that technology are revocable and non-exclusive unless otherwise specified. This may create complications. The nature of AI is that it learns and adapts to new information that it acquires in the course of functioning or that is provided to it by the user. For example, many machine learning and data science AI programs require substantial investments from the energy company to obtain, organize, and input data to “teach” the AI program to function properly. In these instances, the energy company may wish to acquire more secure rights than a mere license in order to maintain the value of its “teaching” investment and the competitive advantage it represents. Further, in a licensing model, energy companies must carefully consider terms and conditions as they relate to the property rights of data inputted into the software. It is generally advisable to restrict the vendor’s ability to use the energy company’s proprietary data to ensure that such data remains confidential and that competitors do not benefit from it. Data privacy is also an important consideration with statutory obligations imposed on the party gathering such data.³⁹ Therefore, the terms and conditions relating to the term of the license, the vendor’s ability to revoke the license, and the property rights in the user’s data and in the “taught” AI model are of particular importance and should be drafted to protect the energy company’s interests.

Finally, the sale of AI technology rights may be subject to risk allocation terms and conditions beyond the express terms and conditions in the contract for sale. Through common law and provincial legislation,⁴⁰ a number of implied terms may also be imported. Most notably, in Alberta, the sale of goods is subject to the *Sale of Goods Act* (the “**SGA**”).⁴¹ The SGA applies to the selling of “goods”, which is defined as:

- (i) all chattels personal other than things in action or money, and
- (ii) emblements, industrial growing crops and things attached to or forming part of the land that are agreed to be severed before sale or under the contract of sale.⁴²

³⁹ See for example: *Personal Information Protection and Electronic Documents Act*, SC 2000, c 5; and *Personal Information Protection Act*, SA 2003, c P-6.5.

⁴⁰ *Sale of Goods Act*, RSA 2000, c S-2; *Sale of Goods Act*, RSBC 1996, c 410; *Sale of Goods Act*, RSM 1987, c S10; *Sale of Goods Act*, RSO 1990, c S1; *Sale of Goods Act*, RSS 1978, c S-1.

⁴¹ *Sale of Goods Act*, RSA 2000, c S-2 [“**SGA**”].

⁴² *Ibid* at s 1(h).

If the AI product is considered a “good”, the SGA and similar statutes in other jurisdictions imply fundamental warranties that the product is of “merchantable quality” and of “reasonable fitness” for its intended purpose. In many cases the purpose of the good is understood and apparent due to its very nature.⁴³ Where the nature of the good is complicated, the intended purpose can be more nuanced and may require clear expression. When the buyer expressly or by implication makes known to the seller the particular purpose for which the goods are required so as to show that the buyer relies on the seller’s skill or judgment, and when the goods are of a description that it is in the course of the seller’s business to supply, whether the seller is the manufacturer or not, there is an implied condition that the goods are reasonably fit for that purpose.⁴⁴

Three aspects of the SGA are critical to note. First, if the AI is not a “good”, the statutory warranty for purpose does not apply and the subject of fitness or purpose and associated risks should be addressed expressly. Second, there is strict liability in contract for breach of SGA implied warranties. There is no “due diligence” or other defence.⁴⁵ Third, application of SGA warranties is limited to the parties to the sale contract itself. These warranties and associated liabilities do not resonate “up the supply chain”. Therefore, if AI software is purchased from a distributor, the SGA warranties (if applicable) provide no remedy against the manufacturer/designer or any other party that may be at fault where the product is of unacceptable quality or is not fit for its intended use. The buyer must turn to tort law if any remedy is to be obtained against a manufacturer or designer of the technology in that scenario, or if recovery is otherwise sought against any other party beyond the privity of a contractual relationship.

The precise boundaries of the SGA warranties have been explored in countless cases and commentaries.⁴⁶ The subtleties of their application and precise application to different circumstances are beyond the scope of this paper. However, as a threshold issue, it is unclear whether sales of AI systems will fall within the definition of sales of “goods” and thus be subject to the SGA. The underlying rationale for the strict liability imposed under sale of goods legislation across Canada does not apply to goods which are not manufactured in the ordinary sense of creating a physical item.⁴⁷ Some AI products would seem to satisfy this rationale while others may not. For example, the sale of a 3D printer or an autonomous vehicle incorporating AI technology is almost certainly a “good” under the SGA definition, but it is much less clear whether a cloud based AI program is also a “good” under the SGA. The relevant jurisprudence indicates that an AI program’s status as a “good” may depend on context.⁴⁸

The issue of how the SGA concept of a “good” applies to software-based programs has been judicially considered in the United Kingdom. Those cases established a distinction between software sold on a physical disk or other physical media, as opposed to software that is downloaded via the internet. The former is captured under sale of goods legislation, while the latter is not. In *Computer Associates UK Ltd*

⁴³ For example, the purpose of lawn mowers is to mow lawns.

⁴⁴ *SGA*, *supra* note 41 at s 16(2).

⁴⁵ *ter Neuzen v Korn*, [1995] 3 SCR 674 at para 105, [1995] SCJ No 79 [“*ter Neuzen*”].

⁴⁶ See for example: *ter Neuzen*; *Gunner Industries Ltd v HyPower System Inc*, 127 Sask R 194, 52 ACWS (3d) 922 (QB); and Lawrence Theall et al, *Product Liability: Canadian Law and Practice*, (Toronto ON: Carswell, 2001).

⁴⁷ *ter Neuzen*, *supra* note 45 at para 105.

⁴⁸ *Computer Associates UK Ltd v The Software Incubator Ltd*, [2018] EWCA Civ 518 [“*Computer Associates*”]; *Accentuate Ltd. v Asigra Inc.*, [2010] 2 All ER (Comm) 738 at 55-56; *Your Response Ltd. v. Datateam Business Media Ltd.*, [2014] EWCA Civ 281 at 18-20.

v The Software Incubator Ltd,⁴⁹ this distinction was affirmed, despite some recognition that that this may be contrary to what would seem to be common sense inferences as to the legislator's intent.⁵⁰ The court stated that "it is [not] open to this court to impute what many might think was a common-sense meaning of "goods" to the legislators."⁵¹ The result has led to calls for statutory reform to expand the application of sale of goods legislation in the U.K. to include downloadable non-physical products.⁵²

Though the distinction drawn in *Computer Associates UK Ltd*.⁵³ between programs delivered on physical media versus those only delivered electronically has not been directly considered in Canada, it may be timely for Canadian provinces to consider some pre-emptive updating of sale of goods legislation to account for the increasing volume of products (including AI systems and licenses) sold without any physical item changing hands. It is difficult to imagine a reasoned rationale for the SGA application to AI programs to depend on the mode by which that product is delivered. The mode of delivery would seem to have little or no significance for the consumer. Expectations as to quality and appropriateness should be the same regardless of whether the program is delivered electronically or on a disk, data stick or other physical media.

Where it is not clear that an AI system or product is a "good", energy companies contracting to acquire and use these technologies should carefully consider the degree to which quality and fitness related warranties must be expressly included in the relevant contract. The SGA expressly states that subject to its specific provisions, "there is no implied warranty or condition as to the quality or fitness for any particular purpose of goods supplied under a contract of sale."⁵⁴ Therefore, the principle of *caveat emptor*, or buyer beware, will largely govern the sale of merchandise that is not captured by the SGA's definition of "goods". Given the uncertainty surrounding the applicability of that SGA definition to many AI products, it is advisable that energy companies seek to expressly incorporate into the sale or license agreements all warranties that they seek to rely on.

Tort Law Considerations

Beyond contractual relationships, tort law will be called upon to respond when AI functions in a program or product result in injury or loss. Tort law in Canada is common law and is fault-based with very few exceptions. It has developed incrementally over centuries, evolving continually to accommodate technical advances in society. Fundamental among the varied purposes of tort law are compensation, deterrence and education.⁵⁵

These and other purposes of tort law are served by a largely fault-based system of liability that allows the cause of the loss to be identified and for liability to be imposed on the party or parties responsible for that cause. Members of the public are encouraged to exercise care to prevent harm to others, and to take care to avoid harm to themselves. Injured parties are compensated to the extent that the injuries are not of

⁴⁹ *Computer Associates*, *supra* note 48.

⁵⁰ *Ibid* at para 52.

⁵¹ *Ibid* at para 55.

⁵² Althaf Marsoof, "Digital content and the definition dilemma under the Sale of Goods Act 1979: Will the Consumer Rights Bill 2013 remedy the malady?" (2014) 9 JICLT No 4 285.

⁵³ *Computer Associates*, *supra* note 48.

⁵⁴ *SGA*, *supra* note 41 at s 16.

⁵⁵ Allen Linden & Bruce Feldthusen, *Canadian Tort Law*, 10th ed (Markham: Lexis Nexis Canada, 2015) at paras 1.8-50.

their own making. The complexity of AI technology, as well as the way AI systems are developed and operate, will provide fresh challenges to this fault-based paradigm of tort liability.

The tort of negligence is the most common, and often the only avenue of recovery available for technology related injuries. John Kingston, a senior lecturer in cyber security at Nottingham Trent University, has considered the applicability of the negligence law model to an AI program.⁵⁶ Kingston notes that a common way to frame the plaintiff's evidentiary burden in negligence is the "ABC rule".⁵⁷ Under the ABC rule, the plaintiff is required to establish three elements:

1. a duty of care is owed to the plaintiff;
2. there has been a breach of that duty; and
3. damage has resulted from that breach.

A duty of care is defined by foreseeability of harm, relational proximity and lack of any policy reason to exclude application of such a duty.⁵⁸ The concepts of reasonable foreseeability and relational proximity have generally been sufficiently malleable to ensure that a duty of care is imposed on product manufacturers for harm caused by the use (and often even the misuse) of their products.⁵⁹ The same should be true of AI products. Kingston agrees that there is little debate that a software manufacturer or designer owes a *prima facie* duty of care to the public, and this duty of care will almost always be breached if the AI program is faulty or unsafe.⁶⁰ The strictness of tort law when applied against product manufacturers is perhaps illustrated by the ubiquity of sometimes obvious warnings on product labels noting the potential damages relating to normal use of the product as well as various foreseeable misuses.

Similarly, a *prima facie* duty of care will generally be imposed on distributors, vendors and users of AI systems and products that incorporate AI where such use has potential to cause injury to third parties or property. As with manufacturers, it should be considered reasonably foreseeable that any person whose interests are directly affected by the operation of an AI system may be harmed by it.⁶¹

The limits of the duty of care imposed on developers, manufacturers, vendors, and users of AI systems in Canada will be defined by established policy related guidelines. The most important of these for present purposes involves the reluctance in tort law to allow recovery of "pure" economic loss,⁶² including the cost of repair or replacement of a defective product.⁶³ The law in this area has been evolving rapidly since the middle of the 20th century to broaden recovery rights, and recovery for pure economic loss has been

⁵⁶ John Kingston, "Artificial Intelligence and Legal Liability" (Paper delivered at the thirty-sixth SGAI International Conference on Innovative Techniques and Applications of Artificial Intelligence, held in Cambridge in December 2016) published in *Research and Development in Intelligent Systems XXXIII*, (Cambridge, UK: Springer Cham, 2016).

⁵⁷ *Ibid.*

⁵⁸ *Cooper v Hobart*, 2001 SCC 79 at para 30.

⁵⁹ *Lambert v Lastoplex Chemicals Co*, [1972] SCR 569, 25 DLR (3d) 121 at paras 12-13; *Donoghue v Stevenson*, [1932] UKHL 100; *Linden*, *supra* note 55 at paras 16.6, 16.13-16.

⁶⁰ Kingston, *supra* note 56.

⁶¹ *Linden*, *supra* note 55 at paras 16.13-16.

⁶² Pure economic loss is a financial loss which is not causally connected to physical injury to the plaintiff's own person or property (Lewis N Klar et al, *Remedies in Tort*, (Toronto: Thomson Reuters, 2020) at vol. 2, 16.IV.1(b)).

⁶³ Meaning financial loss unconnected to physical damage to the plaintiff's own person or property. Financial losses causally connect to physical damage to the plaintiff's own person or property are generally referred to as "consequential" economic loss.

the subject of considerable scrutiny before the Supreme Court of Canada.⁶⁴ Five categories of pure economic loss have been recognized as exceptions to the general rule against recovery:

1. Negligent misrepresentation – recovery requires a reasonable reliance on a representation of a third party, which representation is untrue, with losses resulting. In the AI context, representations made about the capabilities or performance of an AI system to or by an energy company, could result in recovery for pure economic loss on this basis;
2. Negligent performance of a service – closely related to negligent misrepresentation except that the culpable action is the performance of a service relied upon by the plaintiff rather than the provision of advice or information.⁶⁵ Recovery for such an economic loss outside of a contractual relationship requires that the defendant undertake to perform the service for the benefit of the plaintiff and the negligent performance of same, resulting in loss. An AI system used to screen job applicants might attract liability to a rejected job seeker if it wrongfully discriminates due to race, religion, etc.^{66, 67} Similarly if an independent certifying agency is relied upon to ensure safety and product performance, a failure to do so could lead to recovery of pure economic loss under this theory;
3. Repair or replacement of defective products – this type of pure economic loss recovery is generally only permitted when the defective product in question is dangerous to persons or other property.⁶⁸ For example, if a licensed AI system is defective in that it does not perform its intended function, but such defect causes no danger to other aspects of the licensee’s operations or property, recovery will be prohibited.⁶⁹ Conversely, if the defect involves a safety function, recovery may be allowed. For example, in *Hughes v Sunbeam Corp (Canada) Ltd.*, defective smoke alarms which posed no danger to persons or properties themselves were considered dangerous so as to allow for pure economic loss recovery. An analogy to AI failure prediction and prevention applications seems apt in this respect;⁷⁰
4. Relational economic loss⁷¹ (financial loss consequent on physical damage to property of a third party) – the Supreme Court of Canada has settled on a general exclusionary rule against recovery for such losses, subject to three narrow recognized exceptions:

⁶⁴ See *D’Amato v Badger*, [1996] 2 SCR 1071, [1996] SCJ No 84; *Bow Valley Husky (Bermuda) Ltd v Saint John Shipbuilding Ltd*, [1997] 3 SCR 1210, [1997] SCJ No 111; *Canadian National Railway v Norsk Pacific Steamship Co*, [1992] 1 SCR 1021, [1992] SCJ No 40; *Winnipeg Condominium Corp No 36 v Bird Construction Co*, [1995] 1 SCR 85, [1995] SCJ No 2; *Design Services Ltd v R*, 2008 SCC 22; Linden, *supra* note 55 at para 12.3

⁶⁵ Linden, *supra* note 55 at para 12.74.

⁶⁶ Simon Johnson, David Yates & Michael Do Rozario, “Australia: Liability for AI: considering the risks” (01 November 2019), online: *Corrs Chambers Westgarth* <<https://corrs.com.au/insights/liability-for-ai-considering-the-risks>>.

⁶⁷ Greg Meckbach, “The downside risk of machine learning” (8 April 2019), online: *Canadian Underwriter* <<https://www.canadianunderwriter.ca/technology/the-downside-risk-of-machine-learning-1004161697/>>.

⁶⁸ *Bird Construction*, *supra* note 64.

⁶⁹ *Ibid*; *Sentinel Self Storage v Dyergrrove*, 2003 MBCA 136; *Sable Offshore Energy Inc. v Ameron International Corp*, 2007 MSCA 70 CA.

⁷⁰ *Hughes v Sunbeam Corp. (Canada) Ltd.*, [2002] OJ No 3457 (CA), 116 ACWS (3d) 522, leave to appeal refused 2002 SCCA No. 446. Defective smoke alarms were in issue. The Court of Appeal refused to strike the action on the basis that, while the defect themselves posed no danger to person or property, reliance on the defective product might well result in serious damage to persons or property.

⁷¹ Relational economic loss refers to economic loss suffered by a plaintiff as a result of personal injuries or property damage caused to a third party. The plaintiff suffers pure economic loss by virtue of a relationship, usually

- (a) Where the claimant has a possessory or proprietary interest in the damaged property;
- (b) General average cases;⁷² and
- (c) Where the relationship between claimant and property owner constitutes a joint venture.⁷³

5. Independent operational liability of statutory public authorities – where a public authority undertakes or assumes an obligation to inspect or certify, recovery may be made for the cost of repair or replacement where such tasks are negligently performed.⁷⁴ These situations are recognized as unique to public duties and could be relevant in the AI context where regulatory requirements of government approval, inspection or certification of AI systems are imposed.⁷⁵

As many of the risks involved with AI functions in the energy industry are purely economic in nature (for example, operational efficiency related risks involved with AI driven failure prediction and prevention systems and digital twin technology), these principles limiting pure economic loss recovery in tort may prove to be of considerable importance in determining the ultimate significance of tort law in regulating AI development and use in the decades to come.

Significant barriers to demonstrating breach of a duty of care are present in the context of AI related losses as well. The first significant barrier is the traditional tort law burden of proof on a “but for” basis. The diffuse mode of AI development, the often complex nature of AI, and the ability of AI systems to “learn” and to adapt performance will make it extremely difficult (and expensive) for a plaintiff to prove what went wrong and why an AI system causes loss. If the mechanism of harm and the party responsible cannot be identified after the fact, the operation of tort law will be stymied and its societal role undermined.

An understanding of the nature of the technology and its operation is likely needed to determine why any accident occurred. This may be very difficult or even impossible to discern in the context of AI. Injury or loss sustained as a result of actions taken by an AI system might be due to a flaw or feature of an underlying algorithm or in how the various algorithms underlying the system interact with one another.⁷⁶ The cause could instead be flawed or unrepresentative inputs provided to or gathered by the AI system, a failure by the operator to ensure data is up to date, or a defect in some part of a larger product that incorporates the AI system. Similarly, accidents might occur where an algorithmic AI product is used in an environment where it cannot gather appropriate and necessary data for correct and reliable decision

contractual, with the injured third party or the damaged property. Common law courts have traditionally regarded many types of relational economic loss as not recoverable because economic interests have been seen as less worthy of protection than bodily security and property (Lewis N Klar et al, *Remedies in Tort*, (Toronto: Thomson Reuters, 2020) at vol. 2, 16.IV.1(b)).

⁷² “General average” is a maritime law concept where in the event of emergency, if cargo is jettisoned or expenses incurred, the loss is shared proportionately by all parties with a financial interest in the voyage (*Duhaime’s Law Dictionary*, (Victoria, BC) sub verbo “general average”).

⁷³ *Bow Valley Husky (Bermuda) Ltd.*, *supra* note 64; see also Russell Brown, *Pure Economic Loss and Canadian Negligence Law*, 5th Ed (Markham: Lexis Nexis Canada, 2011) at 90

⁷⁴ *Nielsen v Kamloops (City)*, [1984] 2 SCR 2, [1984] SCJ No 29; *Just v British Columbia*, [1989] 2 SCR 1228, [1989] SCJ No 121.

⁷⁵ *Linden*, *supra* note 55 at para 17.41.

⁷⁶ See *Infantino*, *supra* note 17 at 319.

making. The operator may be unaware of the characteristics and possible drawbacks of an AI system in these circumstances. An example might be an autonomous vehicle being unable to read and react to improperly maintained road surfaces or unique external conditions.⁷⁷

Where an accident occurs because the nature and quality of data provided to or gathered by the AI system is erroneous or non-representative, an additional challenge may arise in assigning fault under tort law. That is because the data on which an AI system makes decisions or predictions may not be controllable by the designer, manufacturer, or operator. It may be derived from data inputted deliberately by the operator, or from data gathered independently by the system through operation or through a connection of the system to other sophisticated systems. Given the huge volume of data that can be processed by an AI system, identifying erroneous data and its source may be difficult.⁷⁸ The autonomous nature of data gathering by such a system may also render application of the tort law concept of fault for the erroneous or non-representative data difficult to justify. At the very least, the tort law concept of fault will be extremely difficult to apply where an AI system obtains data from a variety of open sources, independent of the operator (end user).

Similar practical challenges will be faced when seeking to prove the third element of a successful tort case, causation of damage. The complexity of AI systems may make it extremely difficult or even impossible to prove on a balance of probabilities that one potential causative factor resulted in the AI system's actions under the standard "but for" test on legal causation in tort. This is particularly true when the AI system is incorporated as part of a larger product or service. That is, it may be possible to isolate flaws in underlying algorithms, incomplete, erroneous or non-representative data, or other flaws, but tracing back whether one or more of these flaws in fact caused the AI system actions may not be possible.⁷⁹

In this respect, established tort law principles for causation may provide a solution, at least in some cases. As noted by the Supreme Court of Canada in *Snell v Farrell*,⁸⁰ causation should be approached as a "practical question of fact which can best be answered by ordinary common sense rather than abstract metaphysical theory".⁸¹ This approach to the evidentiary burden in negligence encourages causation to be inferred even without evidence of the specific mechanism of injury where the circumstances suggest a causative relationship and any potential evidence to the contrary is in the hands of the defendant. On this basis, causation has been inferred in numerous cases where the precise reason for the accident or mechanism of injury was not or could not be proven on the evidence available to the plaintiff. There is some similarity to the now jettisoned doctrine of *res ipsa loquitur*⁸² which allowed negligence to be found without direct proof where the happening of the event itself, as a matter of human experience and common sense, makes negligence probable. However, this "common sense causation" still requires the identification of a negligent act and identification of a negligent party. As noted, these requirements may present acute challenges where AI related injuries are concerned.

⁷⁷ Infantino, *supra* note 17 at 321.

⁷⁸ Infantino, *supra* note 17 at 319.

⁷⁹ Michael L. Rich, "Machine Learning, Automated Suspicion Algorithms, and the Fourth Amendment" (2016) 164 U. PA. L. Rev. 871 at 886.

⁸⁰ *Snell v Farrell*, [1990] 2 SCR 311, [1990] SCJ No 73.

⁸¹ *Ibid* at para 30.

⁸² *Res ipsa loquitur* was translated by the Supreme Court of Canada as "the thing speaks for itself" in *Fontaine v British Columbia (Official Administrator)*, [1998] 1 SCR 424, [1998] SCJ No 100 at para 17.

When causation on the “but for” standard cannot be demonstrated by utilizing the types of common sense inferences referenced by the Supreme Court of Canada in *Snell*, an alternative doctrine allows legal causation to be found if only a “material contribution” to the loss can be shown. Where negligence by a particular party can be shown, but the complexities of AI make proof of probable causation practically impossible for a plaintiff, Canadian courts may allow recovery if the negligence of the defendant is shown to have created an unreasonable risk of injury of the type occurring.⁸³ However, the Supreme Court has urged caution in applying this relaxed test for causation, indicating that recourse to it will be “necessarily rare” and only employed where fairness demands it and the facts justify such a departure from normal tort law principles.⁸⁴ Though precise boundaries of this “material contribution” doctrine are not well defined, the Supreme Court has indicated that it may only apply where all possible “material contributions” to loss involve negligence, and not where the injury may have occurred without negligence.⁸⁵

Given the comments of the Supreme Court of Canada concerning application of this “material contribution” test, it should be difficult for those suffering AI based injury or loss to utilize that doctrine where obstacles to proof on a “but for” basis are significant. However, the lack of clarity and the precise boundaries of the application of this doctrine may provide an avenue for tort law to evolve to address some of the challenges presented by the proliferation of AI in public and private life. Analogies could be drawn between the many facets of AI development and functioning to the multiple employer mesothelioma cases where the mechanism of causation was clear but the specific source of the causative agent was impossible to determine, tobacco liability cases with a similar dynamic, and the various other cases where relaxed approaches to causation first considered in *McGhee v National Coal Board*⁸⁶ have been applied.

Determining the mechanism of an AI-related loss will also often require a high degree of specialized technical knowledge, which judges and civil juries typically do not possess. Extensive and very complex expert evidence (possibly from a number of witnesses) could be required to show why the AI system functioned as it did. The potential costs involved in proving the mechanism of an AI-based loss would seem to be considerable, making all but the largest claims economically unfeasible and effectively confining tort law remedies to the wealthy. Further, decision makers may be ill equipped to even understand the evidence required to demonstrate how and why a loss occurred. Perhaps the most daunting barrier to the application of tort law concept of fault to AI claims is that fact that for some AI based technologies that incorporate machine learning features, “even the original programmers of the algorithm have little idea exactly how or why the generated model creates accurate predictions.”⁸⁷

Once the mechanism of damage is proven, it may still be difficult to determine who is responsible for any AI underperformance or malfunction. AI systems often have intricate origins with many different parties contributing to development outside of any formalized structure of cooperation. There may be no clear records as to how each aspect of the system was developed.⁸⁸ The tort law doctrines that allow recovery

⁸³ *Clements (Litigation Guardian of) v Clements*, 2012 SCC 32; *Hanke v Resurface Corp.*, 2007 SCC 7 at paras 24-25.

⁸⁴ *Ibid* at paras 13-16

⁸⁵ *Ibid* at paras 13-16; see also Russell Brown, Cause in Fact and the Supreme Court of Canada: Developments in Tort Law in 2012-21, 2014 64 S.C.L.R. (2d) 327 at 3251.

⁸⁶ *McGhee v National Coal Board*, [1972] 3 All ER 1008 (HL).

⁸⁷ Rich, *supra* note 79 at 886.

⁸⁸ Infantino, *supra* note 17 at 318; Rich, *supra* note 79 at 886.

in certain circumstances where causation on the usual “but for” basis is not capable of being proven on a balance of probabilities due to the circumstances of loss⁸⁹ would not seem to assist in cases where a negligent party cannot be identified.

As a partial solution to these causation challenges, Kingston has suggested that causation as between an AI system and an operator or user may often turn on whether the AI system recommends an action or takes an action.⁹⁰ However, this seems to presuppose that reliance on the AI-fuelled recommendation is negligent if harm results. While that may be true in some cases, it would seem like a failure to take an AI-recommended course of action would be a more likely source of negligence. The entire rationale for using AI is to enhance the quality of decision making by allowing the process to be informed by more complete data. Assuming negligence and causation where human reliance on AI leads to loss would seem inconsistent with the concept of fault and the reasonable person standard of care. Kingston’s suggestion also seems to avoid the fact that allowing the AI system to take action without human approval is itself a human choice and may be entirely reasonable in many circumstances.

The practical challenges to the application of tort law principles to AI-related injuries are significant. Perhaps more daunting is the challenge AI presents to the very concept of fault that underlies much of Canadian tort law and advances its fundamental purposes. Given the nature of AI (and particularly machine learning aspects), an AI system itself may be beyond the effective context of designers, manufacturers or users. This scenario is not amenable to current concepts of fault and causation in tort law.

While the common law of tort may well meet these various challenges, that process may take decades or even centuries due to the necessarily reactive nature and culture of incrementalism in common law. Canadian legislatures may therefore feel compelled (as, perhaps, they should) to address some of the troubling uncertainties via regulation.

Regulatory Considerations

Energy development, production and distribution often involve difficult operating environments and hazardous processes. The sector therefore tends to be highly regulated and extensive regulatory approvals are often required for new technologies. As broad societal goals, including those represented in Canadian contract and tort law, are challenged by the complexity and rapid pace of AI innovation, governments will seek to regulate as a means to align AI development and use in the energy sector and elsewhere with those societal goals.

In regulating civil liability, development and utilization of AI, a balance must be struck between addressing legitimate concerns about AI, such as data protection and privacy, and avoiding policies that protect incumbent firms from innovative or technology-driven competition, frequently called “regulatory capture.”⁹¹ This balance will require sufficient flexibility to be extended to start-up firms to develop new products that do not fit into the existing regulatory framework. This facilitates the creation of disruptive

⁸⁹ *Clements, supra* note 81; *Hanke, supra* note 83; see *Linden, supra* note 55 at para 16.90-94.

⁹⁰ *Kingston, supra* note 56.

⁹¹ Pip Wallace, Ross Martin & Iain White, “Keeping pace with technology: drones, disturbance and policy deficiency” (2018) 61.7 *Journal of Environmental Planning and Management* 1271.

new applications of AI that boosts productivity and output. Balanced against this is the need for rules that ensure AI technology conforms to the economic and public safety goals of regulation. This process is similar in theme to the debate in much of the world about the “correct” amount of regulation of mature internet firms.

The regulatory process is by nature deliberative and a certain amount of time is required to develop and pass legislation or adopt rules to govern commercial conduct. The rapid pace of AI innovation and the complexity of AI technology may outpace the ability of governments and regulators to respond to AI-related issues, resulting in a gap between what is technically possible and what is permitted.^{92, 93} This is unfortunate, as transformative technologies, like AI, have the potential to significantly boost productivity and thereby benefit society as a whole. An additional risk is that when innovation outruns the ability of regulators to consider its potential impacts, AI technology may be used with impunity to undermine societal goals and even to accommodate the violation of rights and the commission of criminal acts.⁹⁴ Obviously these outcomes should be avoided as well through regulations that seek to strike an optimal balance to accommodate productivity and growth while minimizing the risk of negative consequences.

The importance of the necessary balancing process required in regulation is magnified in the energy sector where many actors operate in numerous countries with regulatory regimes. Even within Canada, provincial regulatory regimes can differ significantly, and provinces may not have the resources or political will to consider and accommodate AI-based applications at the same pace or with the same level of understanding. Against this backdrop, the Canadian energy sector seeks to rapidly innovate as it faces the current challenges of a low-price environment and increasing publicly-imposed costs such as taxation of greenhouse gas emissions. The sector seeks a consistent and principled regulatory approach to allow optimal leveraging of AI based technology to maintain and enhance profitability.

Environment of Change

Academic literature generally accepts that regulation has not kept pace with technological change in the field of AI.⁹⁵ Industry commentators have noted that Canada lags many jurisdictions in the development of AI regulation, notably the United States (“U.S.”) and the European Union (“EU”). This has led to suggestions that Canada’s cautious approach will force it to eventually align its regulations with those crafted by other jurisdictions as industry adopts these foreign regulations as best practices.⁹⁶ The opportunity to influence the global regulation of AI toward Canadian priorities may be lost.

⁹² *Ibid.*

⁹³ Daniel Malan, “The law can't keep up with new tech. Here's how to close the gap” (21 June 2018), online: *World Economic Forum* <<https://www.weforum.org/agenda/2018/06/law-too-slow-for-new-tech-how-keep-up/>>.

⁹⁴ Emilie Schwarz, “Human vs. Machine: A Framework of Responsibilities and Duties of Transnational Corporations for Respecting Human Rights in the Use of Artificial Intelligence” (2019) 58:1 Colum J Transnat'l L 232.

⁹⁵ Matthew Scherer, “Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies” (2016) 29:2 Harv JL & Tech 353.

⁹⁶ Christopher Alam, “When it comes to AI regulation, Canada can do better” (27 June 2019), online: *Canadian Lawyer* <<https://www.canadianlawyermag.com/inhouse/news/opinion/when-it-comes-to-ai-regulation-canada-can-do-better/276197>>.

The regulation of AI in Canada (as elsewhere) is further hampered by the lack of any agreed upon formal definition of what constitutes AI.⁹⁷ Perhaps as a result, current regulatory oversight of AI is piecemeal and minimal. A broad consideration of what AI regulatory oversight is appropriate will raise a number of questions for policy makers, including: What are the goals of AI regulation, both generally and in the energy sector? What is the priority among those goals? What are the permitted limits of AI applications? What data is acceptable to feed into an AI learning algorithm? The answers to these questions will be reflected in the regulatory approaches and models chosen. Some approaches to addressing these approaches or questions are considered below.

Divergent Approaches

Early attempts to regulate AI in different jurisdictions have yielded divergent approaches. The U.S. has favoured a reactive “light-touch” regulatory approach, believing that the development of AI is a strategic imperative and that over-regulating AI while it is still in relative infancy would risk stifling innovation.⁹⁸ In effect, innovation is presumptively prioritized over the risks of negative outcomes from use of AI under this approach. This mirrors the American approach to regulation of the internet, where a policy of regulatory forbearance was established in order to foster a fledgling industry.⁹⁹ Some point to the success of this approach in arguing for a similar “light-touch” approach to AI regulation. However, there are concerns in other jurisdictions that, if AI is lightly regulated, there will be an erosion of public trust in AI due to public safety risks, commercial risks and potential breaches of employment and human rights.¹⁰⁰ Realization of these risks would undermine the very industry that a “light touch” approach seeks to foster.¹⁰¹

There have already been incidents where an error made by AI has resulted in a severe clampdown on use of that the technology. Most famously, in March 2018, a self-driving car was being tested on the roads of Arizona when it struck and killed a cyclist as a result of an error made by the AI piloting the car.¹⁰² Within a week of the accident the governor of Arizona had banned the car’s owner from all testing of autonomous cars in the state, and other autonomous vehicle firms voluntarily removed their cars from roads across the U.S. as a pre-emptive measure.¹⁰³ Incidents such as these illustrate the harsh response that can be

⁹⁷ Scherer, *supra* note 95.

⁹⁸ Brandon Jackson, “Artificial Intelligence and the Fog of Innovation: A Deep-Dive on Governance and the Liability of Autonomous Systems” (2019) 35:4 Santa Clara Comp & High Tech LJ 35.

⁹⁹ “Eroding exceptionalism – Internet firms’ legal immunity is under threat” (11 February 2017), online: *The Economist* <<https://www.economist.com/business/2017/02/11/internet-firms-legal-immunity-is-under-threat>>.

¹⁰⁰ Matjaž Perc, Mahmut Ozer & Janja Hojnik, “Social and juristic challenges of artificial intelligence” (2019) 5.1 Palgrave Communications 1.

¹⁰¹ Jackson, *supra* note 98.

¹⁰² Phil McCausland, “Self-driving Uber car that hit and killed woman did not recognize that pedestrians jaywalk” (9 November 2018), online: *NBC News* <<https://www.nbcnews.com/tech/tech-news/self-driving-uber-car-hit-killed-woman-did-not-recognize-n1079281>>.

¹⁰³ Faiz Siddiqui, “Tech firms, government officials put the brakes on testing self-driving vehicles after fatal Uber crash” (27 March 2018), online: *The Washington Post* <<https://www.washingtonpost.com/news/dr-gridlock/wp/2018/03/27/arizona-governor-suspends-testing-of-ubers-self-driving-cars-i-was-very-disturbed-by-video-of-fatal-crash/>>.

expected if citizens and their governments believe that development and use of AI-based technology is not subjected to proper vetting and oversight.

In contrast with the American “light touch” approach, the EU has been more interventionist in acting to protect the digital rights of citizens through regulations such as the *General Data Protection Regulation* (“GDPR”).¹⁰⁴ These attempts at pre-emptive codification may be reflective of the civil law, as opposed to common law, tradition in some of the leading EU jurisdictions.¹⁰⁵ The EU approach seems to give greater prominence to values of public safety and protection as against the fostering of an innovation-friendly environment. In a recent white paper, the EU discussed the creation of AI regulations that would be similarly broad in scope to the data protection laws brought in through the GDPR.¹⁰⁶ Other EU publications discuss the need for citizens to trust AI, and that to achieve this trust AI must “respect ethical standards reflecting our values” and the decisions made by AI “must be understandable and human-centric”.¹⁰⁷ These proposals and comments have generated fear that restrictions on the use of data already imposed by the EU’s tight rules coupled with a similar approach to AI will stifle EU-based AI innovation, sapping the competitiveness of the Eurozone economy.¹⁰⁸

This type of concern has a reasonable basis. The minimal amount of physical infrastructure required and high degree of portability of AI development will allow AI developers to quickly respond to regulatory changes and jurisdictional differences in order to gain advantage. In other words, sufficiently intrusive regulation will likely result in a prompt movement of AI development work to other, less onerously regulated, jurisdictions to the extent that is possible.¹⁰⁹ Such “jurisdiction shopping” has the potential to create the proverbial “race to the bottom” as firms can move development of AI systems to jurisdictions with the most favourable regulations. Similarly, where permitted use of AI technology in one jurisdiction may be unacceptable or require significant compliance and reporting obligations in another, disincentives to developing and deploying AI in that other jurisdiction will be strengthened. Consistency with other jurisdictions, particularly where commercial trade ties with the other jurisdiction are extensive, is therefore a vital regulatory consideration.

Canada seems to be leaning towards an American rather than a European approach to AI regulation, with “light-touch” oversight of the industry.¹¹⁰ This likely reflects Canada’s close commercial ties to the United States and the apparently strong interest of the Canadian federal government to develop Canada’s AI industry. This interest was noted in the federal government’s May 2019 announcement that would create the Advisory Council on Artificial Intelligence (“ACIA”). The Council is to provide recommendations on how

¹⁰⁴ Jackson, *supra* note 98 at 44.

¹⁰⁵ France, Germany, Italy and Spain.

¹⁰⁶ “The Brussels effect, cont – The EU wants to set the rules for the world of technology” (20 February 2020), online: *The Economist* <<https://www.economist.com/business/2020/02/20/the-eu-wants-to-set-the-rules-for-the-world-of-technology>>.

¹⁰⁷ “Artificial Intelligence – Shaping Europe’s digital future” (16 April 2020), online: *European Commission* <<https://ec.europa.eu/digital-single-market/en/artificial-intelligence>>.

¹⁰⁸ Jackson, *supra* note 98.

¹⁰⁹ Scherer, *supra* note 95.

¹¹⁰ Chris Reynolds, “Canada lacks laws to tackle problems posed by artificial intelligence: Experts” (19 May 2019), online: *Global News* <<https://globalnews.ca/news/5293400/canada-ai-laws/>>.

AI can create more jobs in Canada, support entrepreneurs, and improve Canada's global position in AI research and development.¹¹¹ Its mandate seems to suggest that presumptive priority will be given to AI development, innovation and application proactively addressing potential negative impacts. However, many groups, including the Office of the Privacy Commissioner of Canada are pushing for stronger oversight of the industry, with some commentators suggesting an increasing appetite in Canada for greater regulation of AI and its applications.¹¹² The ultimate recommendations of the ACIA¹¹³ should prove influential in determining the balance to be struck between innovation and public protection in Canada.

Models of Regulation

Where active regulation of industry is considered necessary, legislatures can either chose to conduct the regulatory oversight directly (in the form of passing laws and regulations) or to delegate rule making authority to appointed agencies with more general mandates and structures as directed by the legislature. Academic literature is generally supportive of the latter approach, particularly where the subject is one in which innovation is both rapid and critically important for economic survival. The legislative process tends to be purely reactive, slow, and often subject to the political interests of the legislators with little expertise in the subject area.¹¹⁴ Agencies can more readily utilize subject matter expertise, react quickly to emergent threats and opportunities, and be proactive when required.¹¹⁵

Many have suggested that the optimal model involves the creation of an agency to oversee AI regulation, set standards for AI development and use, and perhaps offer certification of AI systems that meet its standards as a prerequisite to implementation.¹¹⁶ In Canada, this might involve the creation of an agency that is to AI what the Alberta Energy Regulator is to the Alberta oil and gas industry: a "single-window" agency, staffed by experts, to oversee all aspects of AI within the country. The risk of regulatory gridlock (a complaint often made within the energy sector as well as in communications and other sectors) would need to be carefully considered in designing the mandate, jurisdiction and processes of such an agency, particularly given the stated federal priorities of creating jobs, supporting entrepreneurs, and improving Canada's global position in AI research and development.¹¹⁷

Rather than active governmental oversight, a detailed report by the English House of Lords has suggested instead a self-regulatory model based on the development of an "AI Code". Such a code would be developed by government and would outline ethical standards for the development and deployment of AI across sectors. An appropriate organisation would be assigned to oversee the adherence of

¹¹¹ Jaclin Cassios, "Canada Announces Advisory Council on Artificial Intelligence" (21 May 2019), online: *Dentons Data* <<http://www.dentonsdata.com/canada-announces-advisory-council-on-artificial-intelligence/>>.

¹¹² Lyndsay Wasser, "How Should AI be Regulated in Canada? Speak now, or forever hold your peace!" (22 February 2020), online: *Lexology* <<https://www.lexology.com/library/detail.aspx?g=25bb85d5-5dfc-499b-aebc-c1a83a6a1efd>>.

¹¹³ At this time, there is no set date for the release of the ACIA's recommendations.

¹¹⁴ Jackson, *supra* note 98.

¹¹⁵ Wulf A Kaal & Erik PM Vermeulen, "How to Regulate Disruptive Innovation - From Facts to Data" (2017) 57:2 *Jurimetrics* 169.

¹¹⁶ Jackson, *supra* note 98; see also Scherer, *supra* note 95.

¹¹⁷ Cassios, *supra* note 111.

participants. The code would be founded in overarching principles for the development of AI technology, including such lofty goals as requiring that AI be developed for the common good and for the benefit of humanity.¹¹⁸ The report considered that such a code would help reassure the public that AI is beneficial, which in turn would create an environment where AI innovation can flourish, rather than be villainized and hampered by a mistrustful public. Where it becomes necessary, the code would function as a building block for future active regulation around the design of AI systems.

Potential Accountability Mechanisms

An effective regulatory model should also ensure that firms which develop and use AI are accountable for the products they design, produce, sell and operate. One suggested means of delivering that accountability is a certification/licensing regime. Uncertified AI would attract strict liability (either strict liability of the user, vendor or developer), providing an incentive for firms to licence their AI and for users to buy certified AI products.¹¹⁹ AI that is certified would enjoy limited tort liability, fostering AI development by providing protection to users, vendors and developers.¹²⁰ Other suggestions to ensure accountability include imposing on manufacturers a “reasonable computer” standard of care for AI conduct,¹²¹ and treating AI systems as employees of their owner for purposes of vicarious liability.¹²² All of these are potential regulatory means of removing some of the barriers to accountability under existing tort law principles. The House of Lords has called for the establishment of clear principles of accountability and intelligibility in this area as soon as possible.¹²³

Conclusion

The proliferation of AI technology presents tremendous opportunity for the energy industry to increase efficiency in operations and quality in decision making. However, it also presents many challenges to the Canadian legal system. These challenges should be appreciated and understood by energy firms and policy makers when considering AI-related strategies, as well as when using or otherwise relying on AI systems. How these challenges are addressed may have significant impacts on the risks and rewards realizable through AI.

AI systems present a variety of practical issues in the contract, tort, and regulatory areas. The complexity of AI systems and the nature of the risks involved with AI will test the capacities and ingenuity of those drafting involving AI purchase and usage. Further, the rapid evolution of AI technologies, their often diffuse development practices, and their complex nature may hinder the effectiveness of societal institutions charged with legislating, regulating and applying the law to AI-related matters. These institutions may not be sufficiently nimble and resourced to effectively respond to AI related issues from positions of optimal knowledge and expertise. The relatively slow moving (as compared to the pace of technological development in AI) processes of decision making, policy development, legislating, and

¹¹⁸ House of Lords, *supra* note 16.

¹¹⁹ Scherer, *supra* note 95.

¹²⁰ Scherer, *supra* note 95.

¹²¹ Ryan Abbott, "The Reasonable Computer: Disrupting the Paradigm of Tort Liability" (2018) 86:1 Geo Wash L Rev 1.

¹²² Jason Chung & Amanda Zink, "Hey Watson - Can I Sue You for Malpractice - Examining the Liability of Artificial Intelligence in Medicine" (2018) 11:2 Asia Pacific J of Health L & Ethics 51.

¹²³ House of Lords, *supra* note 16 at para 318.

regulating within these institutions risks injustice at the individual commercial level in making contract and tort claims regarding AI extremely difficult to prosecute. It also risks divergence between use of AI and the interests and values that society purports to hold as fundamental, such as economic efficiency, public safety, access to justice, fairness and equality.

In order to adapt to AI related claims and to provide a means by which they can be “fairly and justly resolved in or by a court process in a timely and cost effective way”¹²⁴ the common law will be pressed to consider the applicability of established approaches to proof and economic loss recovery. Certain established doctrines may provide opportunity for the common law to adapt to AI incrementally but those opportunities seem relatively narrow.

The challenges presented by AI go beyond the practical and include some fundamental concepts of common law. Most notably, the nature of AI may render inapplicable the underlying concept of fault on which negligence law is based. Once operating, an AI system may be beyond the effective control of any human agent, and function in such a way as to cause injury, financial loss, breaches of human rights, or injury to privacy related interests. Such might occur even where designers, manufacturers and users of such AI systems took all reasonable precautions to ensure such consequences would not materialize. This type of scenario (arguably already presented by the 2018 Arizona cycling fatality caused by a self-driving car)¹²⁵ presents conflict among some of the fundamental values underlying tort law. Uncertainty as to accountability for the actions of AI systems risks negative impacts on AI development and implementation as well as to public safety and access to justice.

Regulatory responses in this realm seem to have more immediate promise than the incremental development of the common law – at least in terms of providing some level of civil accountability in a manner consistent with established law. For example, it may be relatively simple to amend sale of goods legislation to apply to AI systems or to provide for vicarious liability on the owner of an AI system (as with an employer/employee) where such system fails to function properly and loss or injury results. Broader regulation of AI development and use involves more complicated balancing of interests and will need to be approached with great care given the long-term impacts of the underlying policy choices required.

¹²⁴ Using the terminology of the “Foundational Rules” (Rule 1.2 specifically) of the Alberta Rules of Court to describe the purpose of such rules.

¹²⁵ Siddiqui, *supra* note 103.