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The Use of Artificial Intelligence in Health Care: Liability Issues

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The Use of Artificial Intelligence in Health Care: Liability Issues

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Abstract/Résumé

This paper explores Canadian liability concerns flowing from the integration of artificial intelligence (AI) in health care (HC) delivery. It argues that the current Canadian legal framework is sufficient, in most cases, to allow developers and users of AI technology to assess each stakeholder's responsibility should the technology cause harm. Further, it inquires as to whether an alternative approach to existing liability regimes should be adopted in order to promote AI innovation based on recognized best practices which, in turn, could lead to increased use of AI technology.

Keywords/Mots-clés: AI, Digital Health, Law, Liability, Doctor, Hospitals, Companies

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I believe this artificial intelligence is going to be our partner. If we misuse it, it will be a risk. If we use it right, it can be our partner.

Masayoshi Son, Founder of SoftBank

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INTRODUCTION

Artificial intelligence (AI) is gaining traction in a variety of industries, including the financial, legal and health care (HC) sectors. Within HC delivery, AI offers a plethora of benefits. In particular, it helps HC professionals in making more timely decisions and even in performing their work. AI technologies are increasingly being developed as tools to assist physicians in diagnosing diseases and identifying appropriate treatments for their patients' condition. For instance, using AI may allow a physician to assess whether his patient will respond to chemotherapy. Imaging, combined with deep learning, may also speed the diagnosis of some cancers, such as those of the lung and skin. AI apps are growingly appealing to clinical care users since it has been demonstrated that they may decrease human fatalities and hospitalizations due to human error (Senate, 2017). In addition, "intelligent" chatbots, such as Babylon, are rapidly gaining acceptance and popularity. Chatbots allow an individual to have a "conversation" with a robot. Different chatbots (some of which are deployed as apps) perform different functions. For example they may serve as monitoring tools or psychological assistants. Chatbots and physical robots both help reducing the loneliness of isolated citizens such as the elderly by acting as life companions. Physical robots may also be used as assistance tools, helping the elderly with domestic tasks and consequently allowing them to remain at home longer. With industry seeking to bring the unit cost of personal assistant robots below \$5,000 in the near future, such devices will likely be found in an increasing number of private homes (Senate, 2017).

The integration of AI in HC attracts attention not only due to its potential to improve the quality and efficiency of HC in Canada but also because it can significantly reduce

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labour costs, as well as hospitalization and fatality rates (Greenberg 2017; Bogoroch 2016). Nonetheless, despite its potential, the integration of AI in HC is still limited in Canada. Because of uncertainties regarding the liability that may attach to the use of AI technologies, there is reluctance to embrace them, particularly within the medical community. As case law evolves—the ongoing legal dispute in Great Britain over investment losses allegedly caused by AI is one of the first lawsuits in the field—more light will be shed on the risks of developing and using such technologies (Thompson & Allouba 2019). For now, however, legal uncertainty seems to have a chilling effect on the further integration of AI in HC. Liability issues and risks are likely to vary according to the type of AI and the context in which it is used. Generally speaking, AI (both apps or physical robots) can be classified according to the “reasoning level” of the technology: weak or strong. “Weak” AI (or “machine learning”) supposes that the robot learns from existing data, whereas “strong” AI (or “deep learning”), implies that the robot not only learns from existing data but creates data itself. This data can be created on a trial and error basis. For instance, if the robot is commanded to fly by flapping its wings and determines that it is unable to do so if they are at 90 degrees, the robot will adjust its wings accordingly. In this case, the learning process is unsupervised. This “process” phase of deep learning is generally referred to as a “black box” with “hidden layers” (Ford & Nicholson Price II 2016; Nicholson Price II 2017). Most AI apps generally fall into the machine-learning category, while physical robot care assistants can use either machine learning or deep learning. Ascertaining how deep learning generates data can range from complex to impossible. “Black boxes” raise concerns due to the difficulty of anticipating how the technology will process and act on the data that it collects. This also creates a disconnect

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between the programmers and the output, since they have no control over the analysis performed by the technology. Establishing liability for a defect might thus represent a challenge when dealing with AI technology that generates its own data based on general commands.

This paper explores the Canadian legal framework that may be called to address issues of liability for injury caused by the use of AI technologies in HC delivery. It does so by examining Canada's two main legal traditions, civil law and common law. The purpose of this text is not to provide an in-depth analysis of the legal ramifications of the use (or non-use) of AI. Rather, through concrete examples, it analyzes the implications of AI in HC and identifies the relevant civil liability (civil law) and torts (common law) principles governing this emerging technology. After addressing liability issues surrounding the integration of AI in medical decision-making (I), this paper examines those related to reliance on AI as assistance tools at home (II).

I. AI and Medical Decision Making

AI as a tool for medical decisions refers to technologies that help physicians in their decision-making process, through the use of apps or other devices. For instance, IBM's supercomputer "Watson" can scan genetic data from the tumours of brain cancer patients in only a few minutes (Lincoln Tsang, D *et al.* 2017). Researchers in Canada are currently developing AI technology aimed at informing surgeons of imminent cardiac arrests while patients are undergoing surgery. If successfully launched, this new technology will enable physicians to react promptly in order to prevent the arrest and avoid its adverse side effects, such as brain impairment (Goldenberg 2018). Other AI tools assist physicians in identifying the most suitable drug for their patient, according to that patient's genetic

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profile (Khan *et al.* 2017). The margin of error associated with AI-assisted HC decision-making is seen as relatively low compared to the risk associated with decisions made by humans alone (Greenberg 2017). And while AI-assisted decision-making still carries a risk of misdiagnosis, so does the failure to use a technology that is increasingly available to HC professionals.

Who Should Be Held Liable for a Mistaken Diagnosis While Using AI as a Tool for Medical Decisions? The Hypothetical Case of Ms. Lafrance.

Below is a fictional case that highlights the liability issues that may arise when misdiagnosis occurs while using AI as a decision-making tool.

Ms. Lafrance

Ms. Lafrance, aged seventy, consults her doctor, Dr. Knapp. It has been a few months since her last appointment and she has recently had a bad cough. Dr. Knapp orders a CT scan that shows a four-millimetre nodule in her left lung. Let us assume that the accepted medical standard of care for nodules under five millimetres is to order follow-up scans every three months until the nodule reaches ten millimetres. In light of the costs associated with this protocol, and his duty to control HC expenditures, Dr. Knapp decides to rely on a new AI technology that combines deep learning and radiomics. It allows him to see genetic mutations that are linked to malignant tumours immediately after the first scan and to rapidly inform Ms. Lafrance that she does not have cancer. Six months later, Ms. Lafrance goes back to her doctor as she is not feeling well. Dr. Knapp orders another CT scan which shows that the nodule has now reached fifteen millimetres. A subsequent

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biopsy reveals that Ms. Lafrance has a malignant tumour. By the time the treatment is initiated, her prognosis has become bleak.

Ms. Lafrance v. Dr. Knapp

In the common law provinces—all Canadian provinces except Quebec—Ms. Lafrance would have to first demonstrate a physician-patient relationship between her and Dr. Knapp in order to establish that her physician owes her a duty of care under the tort of negligence. She would then have to prove a breach of this duty, in that the physician failed to meet the required medical standard of care and was thereby negligent. Meanwhile, in Quebec, where civil law governs liability principles, Ms. Lafrance would typically have to show that her physician failed in his contractual obligation of means, in that he did not use reasonable means in establishing a proper diagnosis, thereby committing a fault. If the misdiagnosis does not result from the physician's lack of prudence and diligence in providing medical services, but is due instead to a malfunction of the AI device used to provide such services, the physician is bound by the same warranties as the seller of that device (CCQ: art. 2103). The extent of these warranties is explained below in our discussion of assistance robots. Whether Ms. Lafrance attempts to demonstrate a departure from the common law standard of care or an infringement of the civil law obligation of means, her burden of proof is similar: she must show that Dr. Knapp did not exercise the level of skill, diligence and judgment that would be expected from a reasonable physician in the same circumstances in accordance with accepted medical practice (*Lapointe v. Le Gardeur*; *ter Neuzen v. Korn*).

In our scenario, it is clear that a physician-patient relationship giving rise to a common law duty of care exists between Ms. Lafrance and Dr. Knapp, as he is her regular

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physician. As for the standard of care that Dr. Knapp must meet, it will usually be established in both legal traditions through expert opinion on the accepted standard of medical practice in the circumstances. Assuming that standard consists in the above-mentioned protocol of ordering a scan every three months for a nodule less than five millimetres until it reaches ten millimetres, it is arguable that by delegating his duty to diagnose to the AI technology rather than following this accepted standard, Dr. Knapp was negligent (in common law terms) or did not comply with his obligation of means (in civil law terms). Indeed, it could be asserted that he should simply have used the AI as a tool to assist him in his decision-making process, just as he would ask a colleague for advice (Ashok 2017; Allain 2013: 1061-62). Following this line of argument, reliance on these new technologies is treated similarly to a pharmacist's use of softwares to flag incompatible drug treatments in a patient's file. It has long been recognized in Quebec that pharmacists can be held liable if they rely solely on the software, without complying with their duty to duly read the patient's file (*Pharmaciens (Ordre professionnel des) v. Bélanger*).

In both legal systems, Ms. Lafrance would also need to prove that the physician's fault or negligence caused her alleged injury. In other words, proving Dr. Knapp's negligence is insufficient. The common law requires showing that the type of injury the patient sustained resulted in fact from the physician's negligence and actions, and was reasonably foreseeable for him (*Wagon Mound I*). The civil law requires the patient to prove that her injury was the direct and immediate result of the negligence (CCQ: art. 1607). The burden of proving these elements, in both legal traditions, lies on Ms. Lafrance, who must demonstrate that it is more likely than not (balance of probabilities standard) that a proper diagnosis would have prevented her injury. For instance, she would have to prove

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that a proper diagnosis and prompter treatment would have led to a favourable prognosis (*e.g.*, a greater than 50% chance of survival). While the demonstration of a causal relation between the misdiagnosis and the ensuing injury will be fairly straightforward in a number of cases, it may sometimes be more difficult as it is not always possible to assess whether the patient's condition was treatable, and the outcome likely to be good, at the time of the misdiagnosis. This is especially so in cancer cases when the stage of the patient's cancer at the time may be unknown.

The introduction of AI in HC has the potential of involving a new party in liability claims, namely the AI company. Could the AI company be held liable toward Dr. Knapp for contractual breach or to Ms. Lafrance for the injury she suffered? These two questions raise distinct considerations and shall therefore be analyzed separately.

Dr. Knapp (or the hospital) v. the AI Company

If held liable to his patient, can Dr. Knapp (or the hospital should it be the purchaser of the technology) sue the AI company[†]? In answering this question, one needs to take into account the terms of the contract between Dr. Knapp (or the hospital) and the AI company. The company's responsibility toward its clients is contingent on the terms of the contract and, in particular, on the scope of the obligations outlined therein.

Most contracts are likely to provide a warranty against technology's defects, through the terms of the contract itself or legal provisions governing the contract. If no such conventional or legal warranty is applicable, finding a breach of contract is likely to be more complex. The physician (or hospital) will have to prove that the technology was

[†] In this article, we assume that the AI company has developed the software. We do not address here the liability risks of the company in charge of providing the data (a matter which should normally be covered by the contract between the AI company and the company providing the data).

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defective and that this defect was in breach of a contractual undertaking. Regardless of the existence of a warranty, the misdiagnosis in our example is probably not due to a defect in the technology, but is instead the result of a foreseeable risk of misdiagnosis due to the inherent limitations of such technology. These limitations do not, in and of themselves, qualify as a defect. However low their rate of error may be, no AI technology—like no human—can ever be 100% reliable. One could argue that the risk of misdiagnosis is “reasonable” given that the AI is meant “to be more accurate *on average* than a physician” and that such accuracy is intended to improve a physician’s knowledge, not to replace it (Greenberg 2017). Therefore, any liability on the part of the AI company would require to prove an actual defect, such as a malfunction distorting or omitting essential data, or else a failure to warn users against the inherent limits of the technology.

Ms. Lafrance v. the AI company

The absence of a contract between Ms. Lafrance and the AI company does not prevent her from claiming damages against the company under extra-contractual liability rules (Quebec) or the tort of negligence (common law provinces).

The tort of negligence requires that she proves negligence on the part of the company. The product safety rules in civil law are more favourable to her. The AI company’s liability can flow from a mere safety defect (CCQ: art. 1468), i.e. where the technology does not afford “the safety which a person is normally entitled to expect” (CCQ: art. 1469). This regime imposes strict liability on the manufacturer, the provider or some of the intermediaries in the chain of distribution, without the need to demonstrate negligence in the manufacturing process. However, accountability becomes dependent of users’ high (or low) expectations regarding the technology (Holder *et al.* 2016). In both

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legal traditions, the low risk of inaccuracy known to be associated with AI decision-making tools would necessarily shape patients' expectations, especially if the use of such technology becomes more widespread and understood. Therefore, it is unlikely that Ms. Lafrance would be successful, unless she can prove that the tool was actually defective (in civil law terms) or negligently manufactured (according to common law rules), causing it to mislead her doctor, which would generally be rare. As was the case for the application of the warranty against defects, it would be insufficient to merely demonstrate the inherent limits of the technology in terms of reliability as an assistance tool for the treating HC professional to show either a safety defect (in civil law) or negligence (in common law).

Can a manufacturer's general warning as to the tool's imperfect reliability, in and of itself, lower the user's expectations in a legally relevant sense, thereby allowing the manufacturer to avoid strict liability? This is doubtful, in that expectations regarding the product's safety are judged according to an objective standard based on a normal user's reasonable expectations given the type of product, and not the subjective expectations of a specific user. A general warning to users that the tool may not be entirely reliable could constitute a waiver of liability, but such waivers are subject to important restrictions, notably where the defendant is a manufacturer or professional seller (CCQ: art. 1732–1733; *ABB Inc. v. Domtar Inc.*, 2007 SCC 50) or where the defect resulted in bodily or moral injury (CCQ: art. 1474).

Another question is whether the patient is bound to choose between claiming against the treating physician or the AI company. If the conditions of liability are met, the victim may have a successful claim against both of them and seek conclusions for joint and several (common law) or solidary (civil law) liability. Going back to the hypothetical case

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of Ms. Lafrance, had the damage been caused both by Dr. Knapp's lack of care in following the usual standards for a treating physician and by a defect of the decision-making AI tool, both the physician and the company could be held liable toward her. If she chooses to sue only one, that defendant could bring an action in warranty against the other to claim its contributive part in the damage suffered by Ms. Lafrance).

Can a Hospital or Physician be Held Liable for an Omission to Use AI as a Tool for Medical Decisions? The Obligation or Duty to Use AI Technology.

The preceding analysis stresses potential liability issues flowing from relying on AI technology in making medical decisions. However, it is equally conceivable that an *omission* to use such technology could lead to malpractice claims. This is especially so if AI offers physicians the opportunity to considerably reduce death and hospitalization rates attributable to human error.

In 2015, the University Health Network (UHN), a research organization, released an analysis of the costs associated with medical errors. According to UHN, "in 2013, inappropriate prescriptions written to older patients cost the Canadian health care system \$419 million, [...] and the costs to Canadians for preventable adverse effects in acute care [amounted] to over \$396 million every year" (Bogoroch 2016). Moreover, "research suggests that about 70,000 patients a year experience preventable, serious injury as a result of treatments [...]. More shocking, a landmark study published a decade ago estimated that as many as 23,000 Canadian adults die annually because of preventable 'adverse events' in acute-care hospitals" (Blackwell 2017). These statistics show the grim reality of errors in HC systems, but also lay bare the opportunity for positive changes through the use of AI.

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Could hospitals and doctors, in the near future, have an obligation to integrate AI technology into their practice? If good medical practice evolves in such a way that the use of AI becomes the norm, a failure to take advantage of this technology, such as when reviewing test results, could eventually trigger liability if the victim can demonstrate a causal connection between the damage suffered and the omission to use the technology. However, the case law suggests that the hospital's liability is likely to be limited if this omission is due to a lack of financial resources (Kouri & Régis 2013).

II. AI as Assistance Tool at Home

AI assistance tools—which can take the form of a physical robot or an app—are increasingly used as home assistants and have shown particular promise in promoting the well-being and health of the elderly and in contributing to increasing their autonomy. As a result of its aging population, Japan was the first country to use robots to help the elderly maintain their independence (Oliveira 2016: 30). For instance, “Twenty-One” is capable of holding and placing a straw in a glass, opening and closing doors, removing a dish from the oven, placing dishes in a dishwasher, helping a person move, and so on (Oliveira 2016: 33). In France, “Romeo” was also developed to assist the elderly in daily tasks, such as opening doors, climbing stairs, and reaching objects on tables (“Robots” 2018). In England, the focus has been on evaluating the impact of a robot's presence on dementia, loneliness and assisting the elderly with daily tasks. The result was “Robbie,” developed to serve as a companion. It has monitoring functions, can watch over the person and can compile data on their consumption habits and activities (Learner 2017). Many other countries have developed, or are in the process of developing, humanoid assistant robots that—like Twenty-One, Romeo and Robbie—have the capacity to analyze an environment and make

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decisions. The development of new apps, including chatbots, is also mushrooming in most OECD countries. Some chatbots are considered potential virtual companions for the elderly and viewed as a way to assist patients with anxiety and mental disorders. For instance, a San Francisco start-up company has developed “Woebot”, a chatbot with the capacity to monitor moods and to engage in brief daily conversations. According to a scientific study, discussions with Woebot can significantly reduce anxiety and depression (Fitzpatrick et al. 2017).

In Canada, provincial governments have not focused significantly on introducing robot care assistants for the elderly in public institutions, and have not yet made significant efforts, for instance through financial incentives, to promote their use at home. At best, there exist local initiatives, such as elderly residences in Prince Edward Island making use of cat robots. These cats provide companionship and seem effective in reducing aggressive tendencies in some individuals (“Des chats” 2018).

Given the aging population and an associated increase in chronic diseases, as well as the objective of enabling the elderly to remain in their homes as long as possible, robot care assistants represent a viable option that should be seriously considered by policy makers and governments. In fact, as mentioned by Panassier, “[TRANSLATION] helping the elderly to maintain their autonomy as long as possible and permitting them to stay at home is an essential role that is expected from robots” (Panassier 2011: 39). Nevertheless, the use of robot care assistants raises both ethical and legal concerns. Aside from privacy issues, which are not addressed in this paper, there may be consequences in terms of liability if their use causes an injury, whether psychological or physical.

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The Use, Benefits and Possible Dangers of Assistance Tools with Elderly or Vulnerable Users. The Hypothetical Case of Mr. Bloom

The following analysis, although focused on the elderly, also applies to other people with physical, mental or social vulnerabilities who seek greater autonomy in their daily life. The fictional case of Mr. Bloom, 75 years old, illustrates our reasoning.

Mr. Bloom

Mr. Bloom, a diabetic, lives alone in Montreal. His children are worried that he might forget to take his medication and that he might get lonely since they live in another province. Therefore, they suggest that he buy a “tele-robot.” Following this advice, Mr. Bloom buys Bobby, manufactured and sold by BobbyAI Inc. Bobby’s head is an iPad. Its base’s movements are controlled both by vocal instructions and algorithms. It has multiple functions: it can move close to Mr. Bloom, chat with him, connect him to his children, remind him to take his medications, and act as a movement sensor. It also acts as a monitoring tool and enables Mr. Bloom’s children to temporarily watch him if the sensor shows no movements for a certain period of time. One day, while chatting with Bobby, Mr. Bloom mentions that he misses his children, to which Bobby responds that Mr. Bloom no longer has children. Mr. Bloom panics and flees to the kitchen, where he falls on the floor. Sensing no movements for a time, Bobby approaches Mr. Bloom but inadvertently falls on him. An emergency signal is then sent to his son who sees nothing on the camera but a section of Mr. Bloom’s kitchen. Neighbours, alerted by Mr. Bloom’s son, rush to his house, where they find him and the tele-robot on the ground. Mr. Bloom is unconscious. At the hospital, the staff determine that Mr. Bloom fell because he did not take his medication that day. His leg is broken due to Bobby’s colliding with him.

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Mr. Bloom v. BobbyAI Inc.

Does Mr. Bloom have a case against BobbyAI Inc.? When the conditions to hold a manufacturer liable for safety defects are met, whether contractual or extra-contractual, both the common law and civil law rules may be invoked to obtain compensation for damages caused by assistance tools.

Quebec civil law provides a high level of protection to victims under contractual rules (CCQ: art. 1458, 1730; CPA: s. 53; Oliveira 2016: 67; Pichette 2007) which are applicable in this case as Mr. Bloom has entered into a contract with BobbyAI Inc. According to article 1458 CCQ, “every person has a duty to honour his contractual undertakings”. One of these undertakings is the legal warranty of quality, which protects the buyer against latent defects. If a latent defect exists, contractual liability rules allow the buyer to act against the seller, intermediaries or the manufacturer (CCQ: art. 1730), as well as against a service provider (CCQ: art. 2103). The buyer must prove the existence of the latent defect, its seriousness, the fact that it was unknown to the buyer at the time of sale, that it was not apparent, and that it existed prior to the sale (CCQ: art. 1726). In the case of a sale by a professional seller (including a manufacturer), the pre-existence of the defect is presumed if the property malfunctions or deteriorates prematurely (CCQ: art. 1729). As a general rule, in order to claim damages, the buyer must demonstrate that the defendant was aware of the defect, but such knowledge may be presumed in the case of a seller who “could not have been unaware of the latent defect” (CCQ: art. 1728), as is the case for a manufacturer or any other professional seller.

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It is worth noting that Quebec's *Consumer Protection Act* grants the victim an even stronger protection in a contractual setting. The strict liability regime established by this statute supersedes the general rules applicable to contracts such as the contract of sale and the contract of service mentioned above. It applies to a contract concluded between a consumer and a merchant in the course of his business regarding goods or services (CPA: s. 2). The warranty owed by the merchant, which extends to the manufacturer and some intermediaries (CPA: ss. 1 & 53), allows to find the defendant liable for damage caused to the consumer if a good that is sold, leased or used for the performance of a service has a latent defect or lacks the instructions necessary for the protection of the user against a risk or danger of which he would otherwise be unaware (CPA: s. 53, paras. 1 & 2). The consumer does not have to demonstrate knowledge on the part of the defendant (CPA: s. 53, para. 3), eliminating the possibility of an exoneration based on development risk (Vézina 2003). As we will see below, this means of exoneration, which is admitted in an extra-contractual setting (CCQ: art. 1473), allows the defendant to argue that the defect could not have been known according to the state of knowledge at the time that the product was manufactured, distributed or supplied.

It is easy to see the relevance of this product liability regime when an elderly person, such as Mr. Bloom, buys or rents a robot as an assistance tool in his capacity as consumer. It is also relevant if the victim hired a service provider, such as an occupational therapist, who used the assistance tool as part of a contract for services. This very advantageous contractual regime extends to a subsequent purchaser, who can invoke a latent defect or lack of instructions against the manufacturer after buying the product from the initial

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purchaser (CPA: s. 53, para. 4). Such would be the case if an elderly person decided to sell an assistance tool to a friend or neighbour in order to get a different or more recent model.

Unlike Quebec civil law, product liability in the common law is mainly based on the tort of negligence, which is fault-based (Thompson & Allouba, 2019). Therefore, Mr. Bloom would have to demonstrate a negligent conduct on the part of BobbyAI Inc. in the manufacturing process or information relating to the use of the assistance tool to hold it liable for the injury caused by Bobby. Negligence may also be invoked against other parties who caused the safety defect, such as those who incorrectly assembled or serviced the assistance tool.

Let us now compare the liability issues if Bobby, instead of falling on Mr. Bloom, fell on one of Mr. Bloom's friends, Ms. Jones.

Mr. Bloom's friend v. BobbyAI Inc.

Sometimes, the victim of an injury is a third party to the contract between the primary user who bought or rented the assistance tool and the manufacturer, supplier or other intermediaries in the distribution chain. Such would be the case if, for instance, Ms. Jones visited Mr. Bloom's home and Bobby's malfunction caused it to fall on her.

In Quebec law, the extra-contractual regime governing product liability would then be applicable to her recourse against BobbyAI Inc. This regime was briefly explained above in relation to the liability of an AI company toward patients for a decision-making tool used by HC professionals. A third party who suffers harm due to an assistance tool must similarly demonstrate that the product presents a safety defect, *i.e.*, if it does not afford "the safety which a person is normally entitled to expect" (CCQ: ss. 1468-1469; Oliveira 2016: 138) in order to claim damages against a manufacturer, distributor (other than a mere

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economic intermediary such as a broker) or a provider. A safety defect may consist in “a defect in design or manufacture, poor preservation or presentation, or the lack of sufficient indications as to the risks and dangers it involves or as to the means to avoid them”. For instance, the safety defect could be the improper programming of the robot by BobbyAI Inc. or its failure to provide sufficient indications as to the necessary precautions to use the robot without a risk of harm (*e.g.*, instructing the user not to call the robot to transport a load over a given weight capacity). The concept of “safety defect” under the extra-contractual regime is very similar to that of “latent defect” and “lack of instructions” under the *Consumer Protection Act* in the case of a victim whose claim is contractual. As in any other civil liability claim, Ms. Jones also has the burden to prove that this safety defect is the cause of the injury for which she claims compensation.

Another Quebec liability regime that could be invoked by the victim in case of damage caused by deep learning tools in the absence of a contract is that of liability for the autonomous act of a thing (CCQ: s. 1465). To be successful against BobbyAI Inc., Ms. Jones would have to demonstrate that it is the custodian of the thing (Bobby) and that harm was caused to her by its autonomous act. While fault-based, this regime provides for a legal presumption of fault that shifts the onus on the defendant to prove an absence of fault. In spite of this presumption, this regime poses its own challenges. One can reasonably argue that the autonomous functioning of a machine-learning AI tool, and even more so in the case of deep-learning AI characterized by autonomous reasoning, could qualify as an autonomous act. It does not differ significantly from situations where courts have found an autonomous act in cases involving more traditional automated or even inanimate objects. In fact, the behaviour of AI is the epitome of the autonomous act of a thing, because the

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remoteness of the initial programming makes it reasonable to conclude that there is no direct human intervention behind the thing's harmful act.

The challenge when invoking this regime lies in establishing that the other main condition for its application has been met: that of custody. The concept of custody applied in the past for more traditional objects comes into play similarly with regard to machine learning tools but, in the case of deep-learning tools, the law enters uncharted territory. Traditionally, the key question has been to identify who the custodian is, rather than whether there was a custodian in the first place. The "custodian" of a thing is the person entrusted to take appropriate measures to maintain, restrain, or even dispose of it as necessary. In that sense, custody can be exercised over machine-learning or even deep-learning AI. By default, the owner is usually considered to have custody due to the inherent powers of ownership. However, the owner may, under some circumstances, demonstrate that the control of the thing was transferred and is therefore no longer considered as having custody over it. It has never been argued that a thing—at least a man-made thing, rather than something wild that has never been appropriated—is not under anyone's custody on the basis of its high level of autonomy. It is worth noting that a thing's custodian need not have full and detailed knowledge of how the thing operates. A person can have custody over a movable or immovable thing without knowledge, for instance, of how its electrical circuits function. Deciding that AI tools are not under anyone's custody would create a dangerous situation, considering that nobody would have the prerogative and duty to control them and that such tools, having no legal personality, would be unaccountable should they cause harm. Accordingly, Mr. Bloom, as Bobby's owner, would normally be the custodian in our case. However, the custody could be transferred to BobbyAI Inc should

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there be sufficient evidence that the company retained an effective control over the robot after the delivery, for instance through an after-sale contract for Bobby's maintenance and regular updates in its programming.

The weakest aspect of a claim based on the autonomous act of a thing is that the custodian can avoid liability by demonstrating that no fault was committed in exercising custody. The level of complexity of an AI tool facilitates such proof, as it may be reasonably easy to establish that a prudent person could not have detected the danger created by the AI tool beforehand, especially in the case deep learning. Still, in some cases where the custodian was forewarned of possible problems due to prior incidents involving an AI tool, irrespective of whether the tool is based on machine learning or deep learning AI, it may be more difficult to rebut the presumption. One could indeed argue that a normally prudent and diligent person would have been able to take appropriate measures in order to prevent the tool from being harmful. The regime established by article 1465 CCQ illustrates the significant limits of a fault-based regime in terms of protection of victims, in spite of a shift in the burden of proof through a legal presumption of fault.

For these reasons, the victim (Ms. Jones) of a defective tool would be better protected under the strict liability regimes relating to safety defects. Under such regimes, as stated above, Ms. Jones could invoke the lack of safety of the product without having to demonstrate negligence on the part of the manufacturer, the supplier or any other intermediary. It would be sufficient to establish that the thing was affected by a defect, as defined under extra-contractual rules (CCQ: art. 1469).

Under a strict liability regime, the victim will be most vulnerable in case of damage caused by deep learning AI, as there is a possibility that the manufacturer, the supplier or

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other intermediaries could successfully invoke the development risk defence described above (CCQ: art. 1473)—especially considering the pace of development in this field (Oliveira 2016: 139)—provided that the defendant has warned users of the defect once it became known. Extra-contractual liability is, hence, less favourable to the victim than the rules of contracts. It is as yet unclear whether this defence could be invoked by BobbyIA Inc. under the general rules governing the contract of sale, as the manufacturer is considered to be the most expert type of seller (*ABB Inc. v. Domtar Inc.*). In the case of a contract governed by the *Consumer Protection Act*, such as the one concluded by Mr. Bloom with BobbyAI Inc., this means of exoneration is unavailable, since the manufacturer or merchant bears the risk generated by scientific or technological advances (CPA: s. 53, para. 3; Vézina 2003). Therefore, the extent of the protection may not be entirely identical for Mr. Bloom and his friend Ms. Jones.

Under common law rules, the victim is not protected to the same extent. Unlike the strict-liability rules applicable in Quebec, the tort of negligence requires to prove the breach of the relevant standard of care on the part of any of the potential defendants. Ms. Jones's common law claim is analyzed identically to the scenario involving Mr. Bloom as the victim. It is also worth noting that under the common law, there exists no presumption of fault or regime of liability based on the custody of a thing as is the case in civil law.

DISCUSSION AND CONCLUSION

In light of the liability issues and uncertainty surrounding the use of “strong AI” assistance tools, some propose to create a strict liability regime specific to AI manufacturers or developers. This would create a strong incentive to get insurance coverage against the risks associated with their technology (Vladeck 2014)—indeed, some

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suggest requiring such insurance. Others have proposed establishing a “no fault” insurance regime (Holder *et al.* 2016). These appealing proposals deserve further reflection. Before considering the design of a strict liability regime specifically addressing the risks associated with the use of AI technology, one must evaluate whether the existing regimes are sufficient to protect victims while mitigating the chilling effect a too stringent liability regime could have on the emergence of new technology through the defence of development risk (when available). Quebec Civil law seems to have found such a balanced approach through the strict liability regimes applicable to safety defects, under a contractual or extra-contractual analysis, with the defence of development risk being available in the latter. Common law jurisdictions may find an interest in borrowing some elements of the law applicable in Quebec or in other legal systems (such as EU law) which inspired the adoption of these regimes in Quebec. As for the proposal to implement a no-fault insurance (or, alternatively, a no-fault compensation scheme) designed to replace or to complement existing liability regimes, this was proposed in Quebec a few years ago regarding medical accidents (Tétreault 2002; Bourgoignie 2006). Such a scheme was never adopted, however, although narrow compensation schemes designed to address specific health-related risks—flowing from vaccination or tainted blood—were created. While there has been recently a renewed interest for this path in the province of Quebec (Accidents médicaux 2019), there are no indications that the legislature is ready at this point to adopt it. Given the time and hurdles involved in reforming liability regimes or implementing a no-fault compensation scheme, victims will have to rely on existing liability regimes for the time being, hoping that the courts will find ways to adapt rules that were designed before the advent AI technology or without having it specifically in mind.

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Until more case law sheds light on the applicability to AI technology of the existing Canadian liability framework, both in common law and civil law systems, preventive measures remain crucial in order to reduce AI-related risks at source. It might be worth considering the adoption of international guidelines on Good AI Design/Manufacturing Practice, similar to the Good Manufacturing Practice Guideline and the Good Clinical Practice Guideline developed by the International Council for Harmonization (ICH).

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