

Appendix 1

Summary of primary and secondary studies included

Author(s), year	Title	Type of Literature	Country of Interest	Aim	Methodology and Sampling	Findings
Bedaf et al. (2018) ^[4]	A multi-perspective evaluation of a service robot for seniors: the voice of different stakeholders	Multi-perspective evaluation	Netherlands	To capture the attitude of older adults towards service robots, as well as the potential use of service robots for older adults	Individual user tests with the robot followed by a questionnaire with older adults (n = 10), informal carers (n = 7) and professional carers (n = 11)	Older adults were more positive about using the robot in the home, while caregivers were more skeptical. They all stated that a future version of the robot should be able to support more complex tasks, to prolong independent living of older adults.
Consilium Research & Consultancy (2018) ^[15]	Scoping study on the emerging use of Artificial Intelligence (AI) and robotics in social care	Scoping study	Focus on UK but includes global examples	To examine the existing international literature in the context of AI and robotics and their uses in adult social care; explore what is currently happening in the context of AI and robotics and their uses in adult social care; and outline workforce issues that might arise as the use of AI and robotics in adult social care begins to grow	A rapid evidence review of existing published literature on the potential for and use of AI and robotics within adult social care was done, along with sector consultation within government, social care and academia fields to identify current practice	The effectiveness of AI and robotics in supporting care provision is relatively under-developed and characterized by research limited due to methodological issues. The literature on assistive robots shows little consideration of how these robots might be commercialized at an affordable price for older people, their families, public services and care insurers. A common hurdle to overcome is addressing cultural change, reluctance and skepticism from the care workforce on the ability of AI and robotics to assist them in their role rather than being a threat to their jobs
Coco et al. (2018) ^[6]	Care Personnel's Attitudes and Fears Toward Care Robots in Elderly Care: A Comparison of Data from the Care Personnel in Finland and Japan	Study	Finland, Japan	To analyze and compare elderly care personnel attitudes toward care robots in Finland and Japan	Cross-sectional survey. 200 Finnish and 86 Japanese care workers answered the questionnaire	Japanese care workers assessed the robots more positively than the Finnish care workers. There were considerable national differences in the perceived importance of various potential tasks for care robots. The study also found there are certain fears related to the introduction of care robots, more so among the Finnish care workers.
Lee et al. (2018) ^[5]	Nurses' needs for	Study	South Korea	To determine the need for	Cross-sectional	Trial centre nurses and those with ≥ 10

	care robots in integrated nursing care services			care robots among nurses and to suggest how robotic care should be prioritized in integrated nursing care services	survey with n = 302 nurses	years of experience reported positively on the prospects for robotic care. The top-three desired primary roles for care robots were “measuring/monitoring”, “mobility/activity” and “safety care”. “Reduction in workload”, especially in terms of “other nursing services” which were categorized as nonvalue-added nursing activities, was the most valued feature. The nurses approved of the aid by care robots but were concerned about device malfunction and interruption of rapport with patients.
Papadopoulos & Koulouglioti (2018) ^[14]	The Influence of Culture on Attitudes Towards Humanoid and Animal-like Robots: An Integrative Review	Integrative review	Global	To explore the influence of culture on attitudes towards humanoid and animal-like robots.	22 quantitative and mixed -method studies were included. Data was extracted and themed, and the Critical Appraisal Guide for Quantitative Studies was used for quality assessment.	Culture influences, attitudes and preferences towards robots were reported, but due to the limitations of the reviewed studies, concrete conclusions were not possible. More robust evidence was reported regarding the influence of culture on nonverbal behaviors and communication styles, with people being more accepting of a robot that behaved more closely to their own culture.
Rantanen et al. (2018) ^[10]	Attitudes towards care robots among Finnish home care personnel – a comparison of two approaches	Study	Finland	To examine the adoption of care robots in home care settings and Finnish home care personnel's attitudes towards robots. The study compares the importance of the Negative Attitudes towards Robots Scale (NARS) and specific positive attitudes related to the usefulness of care robots for different tasks in the home care	Cross-sectional study conducted by questionnaire. The research data were gathered from a survey of Finnish home care personnel (n = 200)	The study shows that NARS helps to explain psychological resistance related to the introduction of care robots. Care personnel's behavioural intentions related to the introduction of robot applications were also influenced by perception of the usefulness of care robots.
Vandemeulebroucke et al. (2018) ^[16]	How do older adults experience and	Systematic Review	Global	To gain a better understanding of how older	Systematic review of 23 qualitative or	Four themes emerged in relation to the use of SARS: roles of a SAR; interaction

	perceive socially assistive robots in aged care: a systematic review of qualitative evidence			adults experience, perceive, think, and feel about the use of socially assistive robots (SARs) in aged care settings	mixed- method studies using thematic synthesis and coding	between the older adult and the SAR, subdivided into (a) the technical aspect of the interaction and (b) the human aspect of the interaction; appearance of the SAR; and normative/ethical issues regarding the use of SARs in aged care. Older adults have clear positive and negative opinions about different aspects of SARs in aged care.
Zafrani and Nimrod (2018) ^[13]	Towards a Holistic Approach to Studying Human– Robot Interaction in Later Life	Literature review	Global	To describe the existing body of knowledge related to human robot interaction (HRI) in later life based on a systematic literature review. Second, it aspires to present a holistic approach to studying older adults’ interaction with robots	Mixed method with 80 studies included in qualitative synthesis and 65 studies included in quantitative synthesis	Overall, the studies reported positive effects of HRI on older adults’ psychological wellbeing and functioning and provided evidence that these effects can be attributed to HRI. Interacting with robots was experienced as a cognitively stimulating, enjoyable, and had beneficial effects on users’ psychological wellbeing. Hypothetical concerns around ethics, privacy and safety were also identified.
Ienca et al. (2017) ^[12]	Ethical Design of Intelligent Assistive Technologies for Dementia: A Descriptive Review	Systematic literature review	Global	To review the spectrum of intelligent assistive technology (IAT) for dementia and investigate the prevalence of ethical considerations in the design of current IATs	Systematic literature review of (n = 517) with quantitative analysis which coded and themed major considerations	The majority of current IATs are developed with no explicit ethical consideration. Autonomy was the most frequent family of ethical considerations, followed by non-maleficence and beneficence. In contrast, justice, interdependence and privacy considerations appeared rare.
Broadbent et al. (2012) ^[11]	Attitudes towards health-care robots in a retirement village	Study	New Zealand	To investigate the attitudes and references of staff, residents and relatives of residents in a retirement village towards a health-care robot	Mixed methods with focus groups and questionnaires using the Robot Attitude Scale from 32 residents, 30 staff and 27 relatives of residents.	Participants showed positive attitudes towards health-care robots; however, there were concerns about the safety and reliability of robots, and a reluctance to use them for highly personal tasks, such as showering. Residents’ attitudes towards health-care robots were more positive than relatives’ and staff attitudes.

Appendix 2

Summary of grey literature sources included

Author(s), Year	Title	Type of Literature	Country of Interest	Aim	Findings
Canadian Institute for Advanced Research (2018) ^[27]	Pan-Canadian Artificial Intelligence Strategy	Government strategy	Canada	National AI strategy, which outlines a \$125 million, five-year plan to invest in AI research and talent.	The strategy has four goals: (1) increase the number of AI researchers and graduates, (2) establish three clusters of scientific excellence, (3) develop thought leadership on the economic, ethical, policy, and legal implications of AI, and (4) support the national research community on AI.
Jang (2018) ^[21]	A Study on the Legal Issues in the Artificial Intelligence Age	Research Report	South Korea	The Korean Legislative Research Institute states that the current legal systems do not adequately respond to the changes seen in commercialization of AI technologies yet and needs to begin discussions on specific countermeasures against possible socioeconomic impacts that the generalized use of intelligence information technology may cause.	Discusses social, economic and legal issues related to AI with industry, academia, or governments playing a central role. The paper made a series of recommendations, including ensuring that AI technology can be used in a way that is beneficial to humans, fosters related industries, and secures control over AI, providing a standard for utilization. It also suggested the current AI-related legal system is not sufficient to include AI technology, as well as social and economic changes and legal problems, so the related statutes should be carefully analyzed to seek legislation. It also suggests that the current privacy act requires improvement in protection and utilization of personal information.
Standing Senate Committee on Social Affairs, Science and Technology (2017) ^[17]	Challenge Ahead: Integrating Robotics, Artificial Intelligence and 3D Printing Technologies into Canada's Healthcare Systems	Government report	Canada	The report examines the role of automation in the healthcare system, with a particular focus on robotics, AI and 3D printing. The committee held 12 meetings and conducted two site visits and heard from several witnesses including researchers, research funders, ethicists, entrepreneurs and healthcare providers	14 recommendations were put forward around the Government of Canada creating a National Conference on Robotics, AI and 3D Printing in healthcare. The aim is to capitalize on current efforts to integrate robotics, AI and 3D printing into healthcare systems through open discussions, and to identify relevant stakeholders to pursue areas of focus or concern that should be addressed in ongoing efforts through separate expert working groups. Areas of focus would include: ethical and privacy considerations; healthcare delivery renewal, including home care; rural and remote healthcare delivery; workforce adjustments, including job losses, job creation, education and training, and; regulatory oversight.
Nevejans (2016) ^[18]	European Civil Law Rules in Robotics	Government report	EU	The European Parliament's Legal Affairs Committee commissioned the study to evaluate and analyse from a	Calls for the immediate creation of a legislative instrument governing robotics and AI to anticipate any scientific developments foreseeable over the medium term, and which could be adapted to track progress. Terminology around autonomous robots needs to be assessed and

				legal and ethical perspective, a number of future European civil law rules in robotics.	built upon. The report questioned whether liability for damage caused by an autonomous robot are consistent with civil liability law as a whole. The report also called for development of a general ethical framework for robotics to establish the main roboethical principles for protecting humanity from robots.
Office of Science and Technology Policy (2016) ^[19]	Preparing for the Future of Artificial intelligence	Government Report	USA	The report surveys the current state of AI, its existing and potential applications, and the questions raised for society and public policy by progress in AI. The report also makes recommendations for specific further actions by Federal agencies and other actors.	The report includes 23 recommendations, many covering topics such as government starting conversations and setting the agenda for public debate, as well as the need to monitor safety and fairness as AI develops. Adaptation of regulatory frameworks that encourage innovation, but also protect the public were noted, along with the need for government to continue to build its capacity to understand and adapt to changes. Recommendations also include supporting research and application of AI to better mankind, while remaining transparent, understandable, and consistent with human values and aspiration.
Woo (2016) ^[22]	A Study on International Discussion and Legal Policy on Artificial Intelligence Technology	Research Report	South Korea	The Korean Legislative Research Institute states the advancement of AI will greatly change social paradigms, and various legal issues that might arise from such changes have been discussed in and out of Korea, including: protection of intellectual property rights for works created by AI; utilization of big data; harmonization with the need for personal information protection; intelligent robot ethics; and product liability.	The report discusses what Japan has done with copyright protection of AI and what the EU has done with their guidelines on regulating robotics which contain regulations applicable to: autonomous vehicles; computer-integrated surgical systems; prostheses; and care robots. Also speaks to the EU resolution to recognizing the legal status of a robot equipped with AI as an “electronic person” and the significance of such guidelines. The study recommends applying a thin copyright protection theory to AI to promote the use of AI creations. The study also warns about challenges faced with protection of personal information and proposes changes to privacy bills. The need to develop legal grounds to determine who should be held accountable for damage caused by malfunctioning AI was also discussed. The need for more research in intelligent robot ethics was proposed to ensure AI is used for the greater good of mankind and not for exploitation of a particular group.
Headquarters for Japan’s Economic Revitalization (2015) ^[26]	New Robot Strategy: Japan’s Robot Strategy	Strategy paper	Japan	To meet challenges of a rapidly aging population, enhanced disaster preparedness and upgrading of aged social capitals, Japan must gather all knowledge and expertise available including utilization of new technical innovation. This will ensure Japan does not	In Japan’s national strategy for robotics, they want to set global standards and specifications for the robot development by collaborating with public and private sectors and disseminating their findings on a global scale. Within healthcare, the basic policy is to help people continue their self-sustaining lives in a region they are familiar with even when they have reached the age at which they need nursing and medical care. Key performance indicators include: (1) The domestic market scale of surgical robots will be expanded to 50 billion yen by 2020 as sales target; (2) through awareness, increase the

				lag behind other countries in trends of robot development.	percentage of people who wish to use nursing robots for providing care to 80% from the current 59.8%, and of those who wish to have robots used when undergoing care to 80% from the current 65.1%; (3) lower the risk of caregivers suffering backaches to zero by using nursing robots for helping with transfers; (4) implement more than 100 cases of support to put medical care-related equipment using robot technology over five years.
Simshaw et al. (2015) ^[28]	Regulating Healthcare Robots in the Hospital and the Home: Considerations for Maximizing Opportunities and Minimizing Risks	Draft report	USA	First aim is to examine the demand for robots in healthcare and assess the benefits that robots can provide. Second is to examine types of robots currently used in healthcare, anticipate future innovation, and identify key regulatory issues. Third aim is to examine the current regulatory framework within which these robots will operate, focusing on medical device regulation and data protection laws.	Current medical device regulation and data protection laws will present legal challenges for the emergence of healthcare robots that must be addressed. Issues of patient and user safety, security, and privacy are likely to emerge. Robots in healthcare will present an unprecedented expansion and centralization of patient data. Proper design must take into consideration these potentials which could harm patients and consumers, diminish the trust of the public in robots, and stifle long-term innovation by resulting in overly restrictive reactionary regulation. Regular review of policies and practices by healthcare institutions will be critical. Agencies should consider developing emerging technology divisions to address these issues as automated and robotic technologies become ubiquitous.
Calo (2014) ^[24]	The case for a federal robotics commission	White paper	USA	To investigate whether robotics call for the establishment of a new federal agency to deal with the novel experiences and harms robotics enables.	The tentative conclusion is that the United States would benefit from an agency dedicated to the responsible integration of robotics technologies into society. The neutral government body would be comprised of experts who would advise on robotic issues at all levels that touch upon the unique aspects of robotics and AI. The time to think through the legal and policy infrastructure for robotics is now.
Knight (2014) ^[25]	How humans respond to robots: Building public Policy through good design	Policy paper	USA	To describe a series of important choices policymakers face in designing robots that people will actually want to use and engage with. Design considerations made today can foreshadow policy choices in the future.	Robotics will benefit from pro-active policymaking and informed, ethical design. Good design and public policy can support a symbiotic partnership with robots by valuing human capability, maintaining consideration of societal goals and positive human impact. There are deep cultural considerations impacting the acceptance and effectiveness of human-robot teams. Researchers need to increase their understanding of the human cultural response to robots, to reveal red lines that policymakers will need to consider.
Palmerini et al. (2014) ^[20]	Regulating Emerging Robotic Technologies in Europe: Robotics	Government report	EU	To offer an in-depth analysis of the ethical and legal issues raised by robotic applications	Legislative intervention is necessary to protect against risks that are largely unknown, and a regulatory framework would help support safe and ethical scientific advancement. Calls for a public, democratic

	facing Law and Ethics			and provide European and national regulators with guidelines on how to deal with them. It tries to respond to the question of whether new regulation is needed, or if the problems posed by robotic technologies can be handled within the framework of existing laws	debate to develop policies. Recommendations include robots in context of self-driving cars, robotic surgery, prostheses, and healthcare service robots. Critical issues noted include safety and protective measures, autonomy, independence, enablement, privacy, social connectedness, justice, and ethics of research. Policy considerations include technoregulations; safety in physical presence and interaction with robots; data security; home-based health care; humanizing design; policies for training caregivers; access and financing; research funding and interdisciplinary research.
European Commission (2012) ^[29]	Public attitudes towards robots	Info-graphic	EU	Graphical representation of interviews conducted to show attitudes towards robots, application areas for robots, and future perspective of robots in the EU	The majority of participants had positive views of robots and agreed that they are useful in different areas of society. Most participants were worried about robots taking their jobs and agreed that careful management of the technology is needed. Most participants believed robots should never be used for care of children, the elderly or the disabled, and felt very uncomfortable with the idea of children or elderly parents being minded by a robot.
Veruggio (2006) ^[23]	Roboethics Roadmap	Project report	EU	The roboethics roadmap aims to clarify opportunities for developing and employing advanced robot technology over the next 20 years. It provides a comprehensive review of robotics and identifies major obstacles to progress.	Recommendations were made in the areas of home servant, outdoor, healthcare, military, and educational robots. For home service robots they recommend updated security and safety measures, and updated legislation for privacy concerns, as well as the need to monitor mental health of elderly with use of these robots. For healthcare robots, concerns of dependability, breakdown, and cost were noted. Overall recommendations include introducing roboethics issues to EU Group of Ethics, creation of a roboethics community alongside a bioethics committee, creation of a roboethics special interest group inside of EURON, and promote public discussion of roboethical issues to increase awareness