Scope

"Global Perspectives on Japan" focuses on developing a global perspective on the study of Japan and Asia. The journal promotes innovative, inter-disciplinary, inter-regional and transnational approaches to Japanese Studies.

The journal aims to be a venue for scholarship in E.M.E.A. region with a special focus on Turkey and neighboring regions. It especially encourages scholars from the Middle East, Balkans, Central Asia and the Mediterranean but also welcomes scholars from other parts of the world.

GPJ invites papers in the fields of history, humanities, and social sciences including topics of the past and the present. In additon to articles, the journal publishes occasional article size translations, book reviews, and surveys of current trends in Japanese and Asian Studies.

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A Framework for the Post-Industrial World: Japanese approach to AI and Society

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Introduction

We are living in an age that has drastically changed with, and been changed by, the way we are dealing with technology and information. Throughout history, we have defined each generation before us in groups, according to their means of fulfilling their basic needs, and we named societies after their most prominent traits. Therefore, just like how we use 'hunter-gatherer societies' as an umbrella term for our ancestors, who lived as a part of the era in our history where surviving was linked to performing hunting-gathering activities. The term *Johou Shakai* or *Johouka Shakai*[1] (information society), introduced by the Japanese novelists of 1960s, seem accurate to define our current society, *a post-industrial society*, where information and data have become prominent factors. The developments in information and communication technologies (ICT) have created an opening for information exchanges in incredible volumes,[2] which has led our species to start using information in ways and volumes that could not have been utilised in previous eras.[3] Every passing year, the advancements in the fields of AI and robotics quickly bring life to concepts that were once thought to belong to science-fiction movies and novels. With the advent of AI, both in research and practice, countries with enough technological capabilities have taken the leap to become a part of this ever-growing field. Similarly, the rise and the widespread utilisation of AI around the world pushes governing bodies

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1 Ibid., 32-33.
2 *Johou Shakai*. 情報社会 and *Johouka Shakai* 情報化社会 (Information society).
3 Nath, "The Information Society," 19-29.

to try to regulate or to at least create boundaries to some degree. To this end, much of the developed world has been creating policies on the subject; however, the technology itself seems to develop much more rapidly than any regulating body can react accordingly. Moreover, from many researchers' points of view, the utilisation of the words 'regulating' and 'regulation' when discussing governmental strategies might feel restrictive of the development of technology and might impede or at least slow the advancements in AI. Thus, while an AI policy of a government does not differ from a governmental regulation, the use of the term 'policy' instead of 'regulation' creates the illusion of a more innovation-friendly governmental approach, an important effort to bring together the scientists and policy-makers to proceed discussing state-of-the-art advancements. The government reports and written strategies that have begun to spring up are quite recent, and there will be many more to follow, as these technological advancements become more widespread. While countries attempt to utilise AI applications, and create governmental documents for these purposes, it should be understandable that they tend to prioritise areas of focus depending on their specific societal problems, as well as take measurements considering the circumstance of the country both on the domestic and global level. In addition to the official documents concerning the development of AI and addressing related needs, the countries also issued papers regarding the ethical and social responsibilities that need to be considered while utilising AI technologies.

Japan, as one of the countries paving the way to create a fairer, AI-based society, has published one of the first and most influential AI policy document that covers many aspects of AI research and real-life applications. The document did not only offer a framework to discuss social, economic and ethical issues that may arise due to the rapid integration of these emerging technologies, it also assessed how these systems will align with the benefit of Japanese society as a whole.

The AI Strategy of Japan

Japan published its AI strategy in March 2017. The Strategic Council for AI Technology, was established in 2016 to create a roadmap for research and development in the field of AI. The Artificial Intelligence Technology Strategy

「人工知能の研究開発目標と産業化のロードマップ」includes a roadmap for industrialization of AI technologies. The plan is deeply intertwined with Japan's societal structure, *Society 5.0*. The priorities of the strategy are health, mobility and productivity as a result of the rapidly ageing population of Japan. The Japanese AI strategy, which will be covered in detail as part of this study, also includes plans of investment in research and development, talent development and start-ups.[4]

In 2019 the Japanese government has compiled two reports on AI. in March and also in June. The March report titled "Social Principles of Human-Centric AI" focuses more on societal aspects, while defining three principles of "Dignity", "Diversity and Inclusion" and "Sustainability". And in June 2019, the Japanese government released another report on the government's approach to AI developments: AI Strategy 2019 AI for Everyone: People, Industries, Regions and Governments ＡＩ「戦略 2019 人・産業・地域・政府全てにＡＩ」. The 2019 report puts emphasis on a more human-centric approach, respecting the principles that were put forward by the March report and the ethical side of technology, while still maintaining the same discourse as the 2017 report. The report also acknowledges that Japan has been lagging behind and should aim to secure a leadership position in the global AI scene.[5]

Society 5.0

In Japan, the biggest societal change in recent history is their rapidly ageing population, as such the government has been designing a remedy to help lighten the burden on the society. One of the solutions to combat this issue is the newly introduced societal structure, *Society 5.0*. The concept for *Society 5.0* or *Super Smart Society* was proposed by the Council for Science, Technology and Innovation in its *5th Science and Technology Plan*. One definition given for Society 5.0 initiative is "A human-centred society that balances economic advancement with the resolution of social problems by a system that highly

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4   Webster, *Theories of the Information Society*, 8-14.
5   NEDO, Jinkō Chinō no Kenkyū Kaihatsu Mokuhyō to Sagyōka no Rōdō Mappu 人工知能の研究開発目標と産業化のロードマップ (The Artificial Intelligence Technology Strategy Roadmap). 2017.

integrates cyberspace and physical space."[6]

The Japanese lay a roadmap starting it with the hunter-gatherer society (1.0), agrarian society (2.0), industrial society (3.0), and the information society (4.0) which we currently reside in and finally *Society 5.0*, creating systems of information and connectivity on both physical and informational level.[7] This initiative's main objective is to create a sustainable society, in which the individuals from different age groups and generations are able to live comfortably and in harmony.[8] The discussion about the best method to integrate new technologies based on AI, IoT and Robotics into our daily lives, is at the moment an important topic in Japanese policy-makers agendas, as advancements in science and technology fields are improving all facets of businesses and society, especially through innovation.[9] The aim of Society 5.0 is "...creating a society where we can resolve various social challenges by incorporating the innovations of the fourth industrial revolution (e.g. IoT, big data, artificial intelligence (AI), robot, and the sharing economy) into every industry and social life."[10]

To support the government in its endeavour to create Society 5.0, *the Advisory Board on Artificial Intelligence and Human Society* was created in 2016 as a part of *Science and Technology Policy* with the aim of advancing research and development as well as the spreading the use of AI technologies. "AI technology is one of the most significant technologies that facilitates the realisation of Society 5.0. The Advisory Board has worked specially to clarify benefits, issues, challenges, and future directions with special attention to AI technologies that exist or will be realised in the near future and a society in which such technologies prevail."[11]

The world around us is changing at an incredibly fast pace, sometimes in places where we cannot perceive it concretely, especially the change that is happening in the digital world. The digital transformation that awaits us will revolutionise not only the industry but also impact social infrastructures

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6 Cabinet Office, AI senryaku 2019 ＡＩ戦略 2019 (AI Strategy 2019).

7 Cabinet Office, *Society 5.0.*

8 Cabinet Office, Dai Go Ki Kagaku Gijutsu Kihon Keikaku 第5期科学技術基本計画 (The 5th Science and Technology Basic Plan).

9 Shiroishi et al., " Society 5.0: For Human Security and Well-Being." , 91- 95.

10 Harayama., "Society 5.0: Aiming for a New Human-centered Society", 8-13.

11 Cabinet Office, *Society 5.0.*

around the world as well. The digital transformation in the industrial sector, especially in manufacturing, has accelerated throughout the world, with programmes such as Germany's *Industry 4.0*, China's *Made in China 2025*, and *Advanced Manufacturing Partnership* in the United States.[12]

Similar to the roadmap for societal advancements, there is also one for the progression of industrial revolutions throughout history. Starting in the 18th century with advancements with utilisation of steam, and mechanisation of production in light industry, *the First Industrial Revolution.* Followed by advancements in heavy and chemical history in the 19th century which is classified as *the Second Industrial Revolution.* In the 20th century, this was succeeded by the developments in computers and creation of the internet, with the *the Third Industrial Revolution. The Fourth Industrial Revolution* was brought upon by a digital transformation and developments in the fields of AI, IoT, blockchain and their utilisation in industry.[13]

The next step to follow the *4th Industrial Revolution* that we currently reside in, is the creation of *systems* that use the *things* or manufactured goods that were handled separately, to become connected with the digital revolution to come. The systems of various fields that already exist separately in our current society will be able to collaborate more easily and freely as the coordination of such connectivity will be much smoother with further digitalization of industry and social infrastructures. This transformation is expected to create change throughout society by structurally changing industries, and, as a consequence, altering the way people live and work. The societal changes to come are especially important for countries such as Japan, that are impacted by an ageing population, where the quality of life cannot be sustained by the current means and structural transformation is crucial in both industry and society, to keep and improve the current quality of life.[14]

The Information Society in which we are assumed to be living in already uses information in volumes never been seen before, and recent developments in the technology field, together with some structural changes in the society due to the advances in information and communication technologies (ICT) have

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12 Advisory Board on Artificial Intelligence and Human Society, *Report on Artificial Intelligence and Human Society.*

13 Li, "China's manufacturing locus in 2025," 66-74.

14 Stearns, *The industrial revolution in world history*.

created an environment for information exchange in very large volumes.[15] The concept of *information society* was proposed to define the *post-industrial society* in which the prominent factor becomes information. Since its first use as a term in the 1960s in Japan as *Johou Shakai* or *Johouka Shakai* (information society) in the social sciences field, there has not been a general agreement on one concrete definition. There are five main characterizations used for information society: technological, economic, occupational (sociological), spatial, and cultural. While they cannot agree upon a concrete definition, what they agree upon is the fundamental description of *information society*, that it utilises incredible amounts of information, like never been seen before by previous generations.[16]

Society 5.0, which is thought to be the next step in the evolution of society, is planned as a more inclusive and highly connective system that will cater to the needs of all its citizens regardless of age, sex, region, language or any other factors. This is a human-centric concept, the main focus being to create equal opportunities for everyone to indulge in an active life and also to have a high-quality life.[17] The central objective is to provide all the necessary services and products to all its citizens equally. The main factor in realising this next step is to further integrate cyberspace and physical space successfully to create more quality data.[18] This is a central difference between Society 4.0 and 5.0 in how the data is analysed. In Society 4.0, the data is usually stored in cloud databases in cyberspace, where people could access the data and analyse it. In Society 5.0, the information is again stored in cyberspace, but the fundamental distinction is, the data is analysed by AI, which is connected to all systems in cyberspace, and afterwards the analysed data is brought back to humans in the physical world. This new practice is expected to bring new values to both the industry and society in various ways.[19]

With *Society 5.0* the Japanese government aims to realise a new societal infrastructure to combat issues that are mainly created by its ageing population. The main subjects they wish to address are; healthcare, mobility,

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15 Fukuyama., "Society 5.0: Aiming for a New Human-Centered Society" , 47-50.
16 Nath, "The Information Society," 19-29.
17 Webster, *Theories of the Information Society*, 8-14.
18 Shiroishi et al., " Society 5.0: For Human Security and Well-Being." , 91- 95.
19 Hitachi, "Realizing Society 5.0 through 'Habitat Innovation'," 3-5.

infrastructure[20] and fintech.[21] Being one of the first countries to face these issues, and search for answers to the problems which will in near future affect more countries, Japan is sharing its answers and helping to create global solutions with Society 5.0.[22] Its universal appeal seems to have prompted scholars from countries ranging from Lithuania,[23] Russia[24] to even China[25] to adopt the term. This concept will be using the technological advancements from the ongoing industrial revolution, Industry 4.0, and create an environment that will ensure a sustainable future. Industry 4.0, in essence, is the integration of industrial and technical systems into cyber-physical systems (CPS).[26] This connectivity is what the Japanese government aims to create in the everyday world outside of the industrial processes.

The Japanese government also expressed its wish to comply with the sustainable development goals (SDGs)[27] set by the United Nations Development Programme (UNDP) in 2015 in its *5th Science and Technology Basic Plan*, by incorporating them into its Society 5.0 scheme.[28] This means that while the *Society 5.0* project is a development system for Japan, it is by no means restricted to Japanese society. The difficulties Japan currently faces as a result of its demographic changes will appear in different nations in the near future around the world as well. By finding solutions to these problems, Japan will be able to help settle these comparative issues worldwide and help accomplish the SDGs.[29]

AI will play a major role in realising Japan's vision for the future and has been gaining popularity as technological advancements create a superior

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20 Harayama, "Society 5.0: Aiming for a New Human-centered Society", 8-13.

21 The reduction in population will lead to less dense areas, where the basic infrastructure services such as water, energy, education and medical services will need to be provided to large and sparsely populated areas, resulting in higher service costs. (Harayama, 2017)

22 Financial Technology. Products and companies that employ newly developed digital and online technologies in the banking and financial services industries.

23 Fukuyama, "Society 5.0: Aiming for a New Human-Centered Society", 47-50.

24 Savanevičienė et al., "Individual innovativeness of different generations in the context of the forthcoming society 5.0 in Lithuania", 211-222. (capital letters for titles on this page)

25 Salimova et al., "From industry 4.0 to society 5.0: Challenges for sustainable competitiveness of Russian industry", 1-7.

26 Wang et al., "Societies 5.0: A new paradigm for computational social systems research", 2-8.

27 A broad concept that collects data from sensors installed in the real world (physical space) in the cloud (cyberspace) via the internet, and feeds the results of analysis back into the real world.

28 United Nations, "Sustainable Development Goals."

29 Cabinet Office, Dai Go Ki Kagaku Gijutsu Kihon Keikaku 第5期科学技術基本計画 (The 5th Science and Technology Basic Plan).

playground for it. The story of AI had already started in the 1950s, more precisely in the summer of 1956, at the *Dartmouth Summer Research Project* (Dartmouth Conference), when John McCarthy, a mathematics professor, coined the phrase *artificial intelligence*. The field of *thinking machines* or AI, as we now call it was launched by a vision shared by the scientists attending the conference. Although they were not in complete agreement on the choice of problems, the general theory, or the methodology, they all believed that computers could be able to do intelligent tasks. Their vision, as it was clearly stated in the proposal of the conference; "The study is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it." A lot has happened in the field of AI during the 60 years that have passed since the conference and even though AI has enjoyed success, disagreements remain. One such fundamental disagreement is whether AI has to be probability-based or logic-based. These disagreements and obstacles can, of course, be tackled. But first, the situation as, Marvin Minsky,[30] expressed has to be changed. His main concerns being was that projects were being chosen on the basis of popularity and only success stories were being published in the field. He also argued that for AI to be considered as a scientific field, failures would also have to be published and shared.[31]

The transformation of society as a direct consequence of advancements in AI is now coming closer to becoming a reality. Technological advancements have paved the way for research in replacing some purely intellectual activities; perception, recognition, reasoning, learning, decision making, to name just a few. AI will be transforming. It will be supporting humanity, enhancing daily activities, and even improving decision making. AI will be creating new business opportunities, services, and new standards in welfare, but this reality will hugely depend on the way it is implemented in real socioeconomic structures. The main difference AI has from earlier technologies is its ability to do things that were previously accepted only

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30 Harayama., "Society 5.0: Aiming for a New Human-centered Society", 8-13.
31 Marvin Lee Minsky (August 9, 1927 - January 24, 2016) was an American cognitive scientist con-cerned largely with research of AI, also co-founder of the Massachusetts Institute of Technology's AI laboratory.

when done by humans.[32]

Another fundamental technology for the enhancement of society is the Internet of Things (IoT). In the Merriam-Webster Dictionary, it is defined as "the networking capability that allows information to be sent to and received from objects and devices using the Internet." The term first appeared at the beginning of the new millennium. In the beginning, it was used as a term to indicate a device able to connect to the internet; but, in the last 20 years since its inception, the term is becoming difficult to define as it has come to mean several things at once. At its core, it is the technology that enables *things* to be part of the connection was made available by the use of the internet. As such, it is called the *Internet of Things*. The ITU[33] report of 2005 further discusses the possible development of IoT

> *... most of the traffic will flow between devices and all kinds of 'things', thereby creating a much wider and more complex 'Internet of Things' [...] if 'things' become active internet users on behalf of humans, then the number of active connections could be measured in terms of tens or hundreds of billions. By connecting the world's things, the internet would truly achieve ubiquity in every sense of the word.[34]*

This is precisely what the Japanese plan to do; to connect 'things', people, and systems in cyberspace, to obtain optimal results with the use of AI technologies. In this new digital era, some of the 'things' in IoT will obviously be robots or robotic machines,[35] and as they start being used in medical fields as well, their value for a society such as Japan, where the population ages and shrinks rapidly, is immeasurable.

It is also worth noting that, in addition to their well-designed AI strategy documents, Japan was one of the early birds when it came to issuing a series of principles regarding ethical AI. In 2017 the Japanese Ministry of Internal Affairs and Communications (MIC) formed an expert committee, AI Network Society, whose members published *Draft AI Utilization Principles*, which was

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32 Moor, "The Dartmouth College artificial intelligence conference: The next fifty years," 87-91.
33 Cabinet Office, *Report on Artificial Intelligence and Human Society.*
34 ITU is the United Nations specialised agency for information and communication technologies - ICTs.
35 ITU, *The Internet of Things.*

followed by a more detailed document offering advice on a global level called *AI R&D Principles for International Discussion.*

Both these non-binding documents mention 9 essential principles: the "Principle of collaboration", the "Principle of transparency", the "Principle of controllability", the "Principle of safety", the "Principle of security", the "Principle of privacy", the "Principle of ethics", the "Principle of user assistance", the "Principle of accountability", which provide a brief but clear framework for safe AI systems.[36]

Another governmental document was issued on 2019 named *Social Principles of Human-centric AI,* by the Government of Japan Cabinet Office, which sets the rules for creating a human-centric AI society that can be integrated within Society 5.0.; in this document, Japan not only highlights the necessity of education, human-centric responsibility, privacy, security fairness, accountability, and transparency, the officials also draw attention to the fair competition and innovation to ensure sustainable advancements.[37]

Another leading group operates within the Next Generation Artificial Intelligence Research Center based in The University of Tokyo, who aims to develop projects within the framework of "human AI",[38] RIKEN Center for Advanced Intelligence Project was established in hopes of finding answers to societal questions while discussing the ethical and legal codes that should be taken into account during the process of implementing AI practices to the layers of society.[39]

In collaboration with Waseda University, Digital Asia Hub held one of the first conferences on the subject named AI in Asia: AI for Social Good in March of 2017, with attendees coming from all over the world including Belgium, the USA, Japan, China and more.[40]

As stated in the report by the Cabinet Office of Japan, *Report on Artificial Intelligence and Human Society*, "Artificial Intelligence (AI) is expected to transform our society, not only by substituting for routinized tasks but also by supporting and enhancing human activities and decision-making." How

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36 Fleisch, "What is the Internet of Things? An Economic Perspective." , 125-157.
37 *Ministry of Internal Affairs and Communications,* AI Network Society, Draft AI R&D GUIDELINES for International Discussions, 7-20.
38 Cabinet Office, Social Principles of Human-centric AI.
39 University of Tokyo, "About us," *Next Generation Artificial Intelligence Research Center.*
40 RIKEN, "About AIP," *Center for Advanced Intelligence Project.*

these technologies will be used is a matter of discussion on its own. If we can harness these new technologies for the good of humanity, they will carry us into the future. "AI technologies support and augment human intellect and actions, and they execute parts of intellectual behaviours on behalf of humans. This is supposed to greatly benefit and empower human society and contribute to ensuring its sustainability." However, the misuse of the same technologies could be detrimental to our lives in deeply disruptive ways.[41]

Japan's "Robotic Revolution"

The swift decline in population, particularly in the working-age population, coupled with the limited number of immigrants, has pushed Japan to look for answers in automation, leading the way for a number of nations around the world, and in a way becoming a social laboratory to research what the future of work might look like.[42] When we talk about robots and robotics, the first place that comes to mind is Japan. Japan has been named the *Robotics Superpower*, *Robot Nation* and has even been called *The Land of Rising Robots*[43] and the Japanese government means to profit from these depictions.[44]

Meanwhile there is also a radical transformation that is taking place in the global arena of robotics, of which the Japanese government wishes to take advantage of. The days when robots were mindless automated machines, doing only routine and simple tasks, are coming to an end. They are becoming "autonomous", with self-learning capabilities, initiative and the ability to create interconnected networks with the advancements in Artificial Intelligence (AI) technologies and Internet of Things (IoT).[45]

The global trends are to increasingly use robotic technologies outside of manufacturing. Japan has also begun to follow this trend, and robotic technologies are now being used in various fields, such as aeronautics,[46]

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41 Digital Asia Hub, "AI in Asia: AI for Social Good."
42 Cabinet Office, *Report on Artificial Intelligence and Human Society*, 4.
43 The University of Tokyo, "Japan: The Land of Rising Robotics. Japan: The World's Leading "Robot Nation."
44 The expression "Land of the Rising Sun" is used for Japan in most countries.
45 Schneider et al, "Land of the Rising Robots."
46 METI, Robotto Shinsenryaku. Bijon, Senryaku, Akushonpuran. ロボット新戦略—ビジョン・戦略・アクションプラン— (New Robot Strategy. Japan's Robot Strategy - Vision, Strategy, Action Plan)

space exploration, medicine, nursing, welfare, disaster investigation, disaster mitigation and rescue.[47]

The Japanese robotics market is currently still dominated by robots made for industrial use, but projections show that by 2025, service robots will have taken over, and have the largest share in the robotics market.[48]

The Japanese government has set some goals to be achieved by the *Robot Revolution*, mentioned in the *New Robot Strategy*, the three main goals mentioned are: firstly, the transformation of daily items such as household appliances, automobiles and housing itself, into robots with advanced sensors and AI technologies, secondly, better utilisation of robots in manufacturing, as well as daily life, and lastly, creating a societal environment where global competitiveness is reinforced in manufacturing and service fields. The government has also a set of objectives for the realisation of the *robot revolution*: the first objective is to transform Japan into a global base for robot innovation, the second objective is to normalise the use of robots in daily life and become the best "society of robot utilisation", and the third objective is the "global development and expansion of the robot revolution", with the aim of acquiring international standards. The government also wishes to reform the machines with robotic capabilities used in daily life in accordance with the second objective, and make them 'easier-to-use' for everybody. In order to accomplish this, technological innovations, developments and environmental transformations are necessary to create next-generation robots fused with AI and easily used platforms that connect singular robots within an interconnected system. The creation of a "robot barrier-free society"[49] will also be crucial for a future where humans can coexist with robots in their daily lives.[50]

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47 A science dealing with the operation of aircrafts.

48 The University of Tokyo, " Japan: The Land of Rising Robotics. Japan: The World's Leading "Robot Nation."

49 Orange Labs Tokyo, *Robot market overview.*

50 "Despite rapid advancement of robots, some point out that there is a huge limit in what robots can do as compared to what a human can do to recognize and cope with diverse situations and therefore we should not expect a dramatic leap in robotics in mid-term. Having said that, it is crucial to meet the requirements for a society where humans and robots can coexist and cooperate on a daily basis for the maximization of robot capacities. Such kind of society can be called "robot barrier-free society" (New Robot Strategy)

Laws and Legislature

We are on the brink of a new era, one that will be dominated by robotics and AI. The increase in robotisation is not confined to manufacturing or industry anymore. Robots and the accompanying technologies are increasingly becoming part of our daily lives.[51] In order to cope with possible problems that might arise, Robot Law is a rapidly developing field, as a new legal framework is needed to deal with any legal issues that might arise with the advent of this new era. In essence, robot law relates to robots and robotic technologies, algorithms, drones, robots used for surveillance purposes, driverless or intelligent cars, virtual reality[52] (VR) and augmented reality[53] (AR). The main issues robot law deals with are both legal questions and ethical questions concerning robots. Some pressing issues regarding this are: what will be the legal status of robots and will they have rights, who will be liable in the case of defective robots, protecting intellectual property, or privacy protection issues with robots processing personal information.[54]

Robots are already handling a large amount of work, previously done by humans, behind the scenes, they are manufacturing products, managing warehouses, and fighting wars. In the near future they will be doing deliveries, cooking meals and doing what are thought to be human activities.[55] These changes our societies are facing will have enormous social consequences along with moral and legal implications. The legal issues and potential repercussions of robots being a part of daily life have been contemplated by legal theorists, as well as philosophers for some time now. There have been studies to identify the possible inadequacies the law may face with the rise of the robots. Most frequently, these questions focus on liability and who should be held responsible in the case of a robot harming or injuring a human

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51 METI, Robotto Shinsenryaku. Bijon, Senryaku, Akushonpuran. ロボット新戦略—ビジョン・戦略・アクションプラン— (New Robot Strategy. Japan's Robot Strategy - Vision, Strategy, Action Plan)
52 Danaher, " Robots, law and the retribution gap," 299.
53 An artificial environment which is experienced through sensory stimuli (such as sights and sounds) provided by a computer and in which one's actions partially determine what happens in the environment. (definition taken from Merriam-Webster Dictionary)
54 An enhanced version of reality created by the use of technology to overlay digital information on an image of something being viewed through a device (such as a smartphone camera). (definition taken from Merriam-Webster Dictionary)
55 Michalsons, "Robot Law is an emerging field of law."

being,[56] and, from time to time, more philosophical questions, such as if a robot should be legally and morally responsible, are asked.[57]

The laws regarding robots and AI technologies are newly developing, and as Nicolas Petit puts it, there can be an

> *... inconsistency between an innovation-adverse rule of strict liability on AI programmers on the one hand and an innovation-friendly legal framework that encourages computer scientists to work on AI through the allocation of subsidies, intellectual property ("IP") rights and tax benefits on the other hand. Or consider a statute that confers dignity rights to robots. As part of such rights, a prohibition of torture would prevent to test how a robot reacts in stressful circumstances, and in turn undermine experimental research on the design of safer robots.[58]*

Often, the law takes some time to catch up with technological advancements that have taken place, but in the end it does. The law takes some time to get used to new ideas, and how to incorporate them into existing laws. A similar period occurred in the 1990s with the internet becoming more and more mainstream. There were now unanswerable questions about jurisdiction, ownership and control, what 'net neutrality' should mean and of course privacy. To find solutions to these problems, legal academics rose to the challenge and developed *cyberlaw*. Robot technologies are on their way to creating a new transformation, and with a main difference from the internet, the robots are merging the question of information and privacy, with the capability to cause harm physically.[59]

When approaching the regulation of robots and AI, two dominant patterns emerge. *legal* and *technological*.[60] The first route begins within the legal system and draws a list of issues within the legal system which could be affected by robots and AI: privacy, cyber security, liability, and more.[61] The second route tries to predict legal issues that might arise from the

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56 Kaplan, *Humans need not apply.*
57 Calo et al., *Robot law.*
58 Purves, et al., "Autonomous machines, moral judgment, and acting for the right reasons."
59 Petit, "Law and Regulation of Artificial Intelligence and Robots," "2.
60 Calo, "Robotics and the lessons of cyberlaw," 514-515.
61 Petit, "Law and Regulation of Artificial Intelligence and Robots," 2.

application of new technologies; intelligent cars, social robots, exoskeletons, and others.[62] A third approach to regulating the laws about robots and AI, differentiates between robolaw and robot ethics. Robot ethics mainly focuses on the appropriateness of their utilisation, in some ways like the three laws of robotics[63] created by Isaac Asimov. Whereas robolaw mainly focuses on the external implications of robots' actions,[64] the execution stage focuses on where robots are brought into society.[65] There is another field of ethics in robotics called machine ethics. It is a more speculative field, as it considers the actual behaviour of advanced robots. This pertains to the future, where the robots might have self-awareness and the capability for moral judgement, and thus can be judged according to their actions.[66]

There is a need to create a legal system that is not too lenient nor too restrictive, so as not to slow down the innovation processes. An additional problem that comes out when creating a legal framework about robots is the issue of retribution. Humans crave retribution when they, or people close to them, are harmed.[67] The robotization of society will make it likely that robots will be responsible for harming humans, but they will not meet the conditions for retribution. The *retribution gap* might generate social and legal ramifications, which the legal academics should keep in mind when creating the laws on robotics.[68]

The UN has also joined in on the development of a legal framework concerning AI and robotics, as they agree that, along with the beneficial developments these new technologies will bring, they also raise some concerns about safety and security. The technologies themselves, especially robotics, have the innate capability for physical harm, but there are also

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62 De Cock Buning et al., "Mapping the Legal Framework for the introduction into Society of Robots as Autonomous Intelligent Systems."

63 Palmerini et al., "RoboLaw: Towards a European framework for robotics regulation."

64 "A robot may not injure a human being or, through inaction, allow a human being to come to harm. A robot must obey orders given it by human beings except where such orders would conflict with the First Law. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law." (Asimov, "Runaround", Astounding Science Fiction 1942.)

65 There also seems to be some sociological ramifications. Where Robolaw seems primarily a field populated by lawyers, robot ethics also consists of philosophers, ethicist, psychologists, computer scientists and novelists.

66 Petit, "Law and Regulation of Artificial Intelligence and Robots."

67 Anderson et al., "Machine Ethics: Creating an Ethical Intelligent Agent."

68 Jensen, "Punishment and spite: The dark side of cooperation."

considerations about the using of force autonomously, algorithm bias,[69] black boxes in decision making,[70] privacy issues and certainly the danger of criminals or terrorist misusing the technology. To address these issues, in 2015, the United Nations Interregional Crime and Justice Research Institute (UNICRI) commenced its programme on robotics and AI, to educate the people in the field, and especially the policy makers. Following this in 2017, with the assistance of *the Municipality of the Hague* and *the Ministry of Foreign Affairs of the Netherlands* UNICRI opened *the Centre for Artificial Intelligence and Robotics.* The centre is mainly committed to recognizing, focusing on and educating about the dangers and advantages of AI and robotics, in the context of crime and security. To achieve success UNICRI has created a vast international network.[71]

It is universally acknowledged that, for mainstream acceptance of robotic technologies and AI in general, society and to safely include them in daily life, one main problem to consider is the legal issue regarding the clarification of responsibility. One frequently used example is the problem of autonomous cars. While the use of autonomous cars, or intelligent cars, leads to a decrease in traffic accidents, the problem emerges if and when one such car creates an accident. To whom does the responsibility belong when such an accident occurs? For a wider implementation of smart cars, robotic technologies and AI in general into a society, there has to be a clear understanding of the allocation of responsibility for accidents, risks, privacy and rights issues, as well as achievements and benefits. This will also be crucial in helping businesses to not overreact or become intimidated because of risks to their reputation or economic burdens.[72]

Another heatedly debated topic concerning responsibility is the issue of *autonomous weapon systems* (AWS), which will in the near future, with advancements in AI technologies, have the capability to decide on matters of life and death 'on their own'. The main argument is that AWS, or robots in general, cannot reproduce 'human moral judgement'. In the article

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69 Danaher, " Robots, law and the retribution gap," 299.
70 Algorithm bias, also known as machine learning bias or AI bias, is a phenomenon that occurs when an algorithm produces results that are systematically prejudiced due to erroneous assumptions in the machine learning process.
71 When AI makes decisions that humans can not understand, or follow the thought process.
72 UNICRI, "Artificial Intelligence and Robotics."

'Autonomous machines, moral judgement, and acting for the right reasons', moral judgement is defined as "... (it) requires either the ability to engage in a wide, reflective equilibrium, the ability to perceive certain facts as moral considerations, moral imagination, or the ability to have moral experiences with a particular phenomenological character." As robots do not possess these characteristics, it is not morally acceptable to deploy the AWS's. Following the responsibility argument, the deployment of AWS would bring about what are called *responsibility gaps*.[73] An example of this issue was argued by Robert Sparrow, where in asking to whom the blame would go, if an AWS makes a mistake in the battlefield and kills a civilian, as no one could be legally held responsible; not the robot, the commander, the programmers, or others. This would result in a responsibility gap, making the deployment of AWS morally dubious. Following through with this objection, it is important to distinguish between weaponized and non-weaponized autonomous technologies, such as autonomous cars, so as not to obstruct the advancements in technology and innovation.[74]

Another significant issue in the legal arena is privacy protection. As the advancements made in the AI field and consequently in the robotics field are highly reliant on data, their usefulness relies on their ability to exploit and use big data. To avoid what may feel like an invasion of privacy, it is imperative to create institutional frameworks. Access rights of personal data, portability of data, and security issues related to international corporations are some of the main concerns around privacy. And the use of this technology, boosts the creation of high-value and high-profit products. It is important to recognize the issue of ownership: to whom do the property rights belong of a creation or a model made by AI. Moreover, to utilise and facilitate further development, there have to be clear guidelines to protect developers and users of algorithms, and also data providers as the protection of the creative rights is another issue the legal frameworks on AI and robotics are working on.[75]

The global policies are moving forward with trying to solve the issues created by new technologies of AI and robotics. Japan, named as a *Robotics*

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73 Cabinet Office, *Report on Artificial Intelligence and Human Society*.
74 Purves, et al., "Autonomous machines, moral judgment, and acting for the right reasons."
75 Sparrow, "Killer robots."

Superpower, is also transforming its policies to create a more technology-friendly legal system. Examples like the *Radio Act*,[76] the *Road Traffic Act* and the *Road Transport Vehicle Act*[77] clearly show that the Japanese are eager to solve possible legal issues that might arise, and to create solutions with new introductions to technology. There are also changes made in order to make it easier for the use of new technologies in the medical field. *The Act on Securing Quality, Efficacy and Safety of Pharmaceuticals, Medical Devices, Regenerative and Cellular Therapy Products, Gene Therapy Products, and Cosmetics* is one example of this new transformation.[78]

The future that the Japanese government wishes to achieve is deeply connected to the new societal scheme, called *Society 5.0,* where technological advancements will relieve humans from routine daily tasks and make way for a higher quality of life. This will be notably significant in nursing and medicine sectors, as the population ages and labour-shortages become even more prevalent, due to decreased fertility. The routine tasks being managed by the robots and robotic technologies will allow for better quality nursing-care and advanced medical-care for every individual.[79] And this future will only be made possible if the necessary legal adjustments are made, and the system as a whole becomes more innovation-friendly.

Conclusion

Societies around the globe have been changing at speeds never before seen, and at the core of this lies technological advancements. Japan, as an industrialised country, has also felt the effects of this change. At the same time, they are also facing societal changes unrelated to this technological change like population decline, ageing population, and labour shortages, to name a few. But upon reviewing governmental documents, it is easy to see that the Japanese government aims to counter the issues that arise from

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76 Cabinet Office, *Report on Artificial Intelligence and Human Society*.

77 The establishment of rules aimed at robot utilization such as frequency allocation and regulate maximum permitted power.

78 The sorting-out of legal position of vehicles equipped with robotic functions.

79 METI, Robotto Shinsenryaku. Bijon, Senryaku, Akushonpuran. ロボット新戦略—ビジョン・戦略・アクションプラン— (New Robot Strategy. Japan's Robot Strategy - Vision, Strategy, Action Plan)

population changes with solutions born from these new technologies. To this end, they have also created a roadmap of sorts titled Society 5.0. A human-centric approach to solving problems. They acknowledge that AI is one of the most important aspects of realising this new societal scheme.

In the midst of these technological changes, the Japanese government also is incorporating robotic technologies to its strategies. And it is also true that the AI technologies in Japan are more entwined with robotics than their counterparts. While it may be because their physical manifestation makes them more visible, it is also true that robots also play a big role in the social consciousness of Japan. The government plans to make use of this by once again becoming a major player in the robotics and also AI fields globally. It is clear to see that these new technologies will dominate almost every facet of our lives in the near future and the Japanese government is right to think that by investing in these technologies, they could solidify their standing in the world of technology.

The Japanese government has put effort into creating ethical guidelines for the use of these new technologies much faster than the rest of the world. While it is up for debate how faithful they are to these ethical roadmaps, it is also obvious that it is a point of concern. Every new technology brings with it some issues that were not thought of before. But with the advent of AI and related technologies, it is more important than ever to create and apply ethical guidelines, and the faster the legal side catches up the better, as the speed at which new technology advances compounds by the day.

We believe it is important for the government to create roadmaps for the future, where these new technologies will be more important than ever. But it is also important to create a society which is ready to accept the changes that will happen to their daily lives as a result of AI and robotics. As AI and robotics become more embedded into our day to day lives, it becomes even more important to educate our societies and also address any issues that may arise in the process.

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