

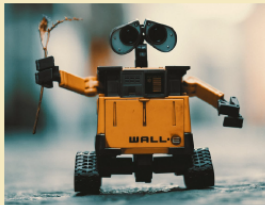


FACULTY OF LAW, UNIVERSITY OF MALAYA

**CELEST**



CENTRE FOR LAW AND ETHICS IN SCIENCE AND TECHNOLOGY



## IN THIS ISSUE

### Featured Article

Dr Mohammad Ershadul Karim discusses the regulation of Artificial Intelligence and provides an overview of regulatory responses in different contexts. He explains both the problems with and the importance of definitions and highlights a number of challenges that arise from the use of AI applications. He concludes that broad principle-based anticipatory regulations coupled with assessment tools or check lists would pave the way for countries to safely develop AI applications while continuing to consider more detailed mechanisms.

### News

Congratulations to our members on the following publication:

Kuek Chee Ying, Dr Sharon Kaur & Associate Professor Dr Tay Pek San. (2019). The Need to Address Legal Ambiguity on Conceiving Saviour Siblings in Malaysia, Health Policy and Technology. Doi:10.1016/j.hlpt.2019.07.003 (ISI-Indexed).

Source: [www.canva.com](http://www.canva.com)

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## Events

- **25 July 2019**

Dr Ainee Adam spoke on 'A Retrospective Assessment of the Social and Economic Benefits of IP Chapters in Trade Agreements' at the Journal Club, Faculty of Law, UM.

- **6 August 2019**

Puan Ainul Azlinda Binti Inon Shaharuddin, Head of the Legal Department of Telekom Malaysia Berhad presented a talk on 'Protection of Personal Data: The Experience of Telekom Malaysia Berhad'.

- **13 August 2019**

Dr Zalina Abdul Halim and Dr Izura Masdina participated in the Microsoft Learn Evaluatory Workshop concerning e-learning.

- **19 August 2019**

Dr Sharon Kaur spoke on 'Conflicts of Interest and Institutional Review Boards' at a workshop by Master of Health Research Ethics Programme (MOHRE), Faculty of Medicine, UM.

- **19 August 2019**

Puan Eulis Rachmatiah Binti Iskandar, Head of Ethics Office, Celcom Axiata Berhad presented a talk on 'Ethics and Privacy Aspects' in Celcom.

- **21 August 2019**

Joseph Ali, JD, Assistant Professor, Berman Institute of Bioethics, Johns Hopkins University, US presented a talk on 'Consent for Global Mobile Phone-based Noncommunicable Disease Risk Factor Surveillance' at Faculty of Medicine, UM.

The event was jointly organized by MOHRE and CELEST.

- **28 August 2019**

Dr Sharon Kaur spoke on 'Parental Rights, Best Interests and Significant Harms: Medical Decision-making on Behalf of Children' at the Journal Club, Faculty of Law, UM.

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## Upcoming Events

- **11 September 2019**

Messrs Lee Hishammuddin Allen & Gledhill will be having a panel discussion with the final year law students, Faculty of Law, UM on 'Legal Tech: Powering Tomorrow's Practices' to discuss the challenges and opportunities technological disruption is bringing to law practice and clients' businesses.

## ***Regulation of Artificial Intelligence: An Appraisal of the Recent Trends***

***By Mohammad Ershadul Karim, PhD  
Faculty of Law, University of Malaya***



### ***Author's Biography***

*Dr Mohammad Ershadul Karim is a Senior Lecturer at the Faculty of Law, University of Malaya. He received his doctoral degree for his research entitled 'Human Health and Environmental Implications of Nanotechnology in Malaysia: A Legal Study'. He teaches Nanotechnology Law and Policy, Information and Communication Technology Law, Privacy and Personal Data Protection Law, and Research Methodology at postgraduate level. His research interests revolve around the legal and regulatory aspects of emerging science and technologies. He has just completed his research on 'Legal and Regulatory Aspects of Functionalised Nanomaterials' and is now working on 'Legal and Ethical Issues in Biosensors'.*

## **Introduction**

Artificial Intelligence (AI), a recent buzzword in this era of the fourth industrial revolution, is not a new idea or phenomenon. Different aspects of AI were very much embedded in various applications run by information and communication technologies even in the first generation of computers (1940-1956). In 1950, British mathematician and computer scientist, Alan M. Turing wrote a paper titled 'Computing Machinery and Intelligence' to explore the answer to the question- "Can machines think?" Allen Newell, Cliff Shaw, and Herbert Simon revealed the answer to this question positively when they were successful in developing a program named 'Logic Theorist'. Mathematician John McCarthy first used the term 'Artificial Intelligence' in an academic conference held in 1956 where 'Logic Theorist' was presented.

However, even after years of experimentation, tensions, and failures during the second and third computer generations (1957-1970), AI researchers could not achieve their desired successes due to, *inter alia*, lack of computational power. This changed with the invention of the microprocessor in the fourth generation of the computer in 1971, researchers started to see the light at the end of the tunnel. Finally, with the availability of high-speed internet and data processing technologies propelled by powerful computers and machine learning platforms, many dreams of the researchers, which previously only existed in theory, started to come true through AI applications.

Notwithstanding the many promises and benefits of AI technology, a myriad of complex legal and ethical issues, such as issues relating to security, personal data protection, bias and discrimination, intellectual property, etc. have been raised by various parties. As a result, in the last two years, regulators, mainly from the developed countries, have taken initiatives to regulate AI and applications powered by AI in the form of 'soft law'.

Though regulation is viewed as being a fundamental part of the successful exploitation of technological advancements and applications, the approach that appears to have been taken is that the technology itself should not be regulated but rather various applications should be the subject matter of regulation. In order to harness the potential of AI applications, regulators in developed countries and global tech giants have started to introduce some policy initiatives with specific, measurable and achievable targets in recent times.

This article begins by considering the conundrum of defining AI and focuses on a number of prospects and challenges of AI technology. Following this, the article highlights a number of regulatory initiatives and responses. Newcomers and countries without such initiatives may find these beneficial and can consider these measures to ensure the safe, sustainable and responsible development of AI applications in their context.

## **Artificial Intelligence: Definitional Conundrum**

A universally accepted and consensus-based definition of ‘artificial intelligence’ is difficult to articulate. It is, to some extent, impossible as even in 2007, scholars identified at least 70 definitions of AI. Nevertheless, it is neither necessary nor desirable to discuss all these definitions. At present, the definitions offered by European Union (EU) working groups provide a good starting point.

The European Commission (EC) in its Communication on AI, 2018, has attempted to define AI as- “systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals. AI-based systems can be purely software-based, acting in the virtual world (e.g. voice assistants, image analysis software, search engines, speech and face recognition systems) or AI can be embedded in hardware devices (e.g. advanced robots, autonomous cars, drones or Internet of Things applications).” This is a useful way of setting out a definition as the first part provides a technical explanation of the term, followed by the second part, which provides practical examples of what amounts to AI.

More recently, the EC in aiming to harness the benefits of AI, formed a High-Level Expert Group on Artificial Intelligence (AI HLEG). The AI HLEG is a body of 52 experts from academia, civil society and industry. In April 2019, the AI HLEG expanded this above definition in the following manner-

“Artificial intelligence (AI) systems are software (and possibly also hardware) systems designed by humans that, given a complex goal, act in the physical or digital dimension by perceiving their environment through data acquisition, interpreting the collected structured or unstructured data, reasoning on the knowledge, or processing the information, derived from this data and deciding the best action(s) to take to achieve the given goal. AI systems can either use symbolic rules or learn a numeric model, and they can also adapt their behaviour by analysing how the environment is affected by their previous actions.

As a scientific discipline, AI includes several approaches and techniques, such as machine learning (of which deep learning and reinforcement learning are specific examples), machine reasoning (which includes planning, scheduling, knowledge representation and reasoning, search, and optimization), and robotics (which includes control, perception, sensors and actuators, as well as the integration of all other techniques into cyber-physical systems).”

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*This very extensive definition has depicted AI both as a system and scientific discipline. Such a definition can initially be welcoming; however, from the regulatory point of view, such elaborated language in any definition will make implementation troublesome and will demand further explanation through supporting documents. In this context, the Organisation for Economic Co-operation and Development (OECD) has defined an AI system, in a very lucid manner, as “a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments. AI systems are designed to operate with varying levels of autonomy.”*

*At the municipal level, the National Policy on Industry 4.0, 2018 of Malaysia has attempted to define AI. According to this Policy, “AI is a concept that is made up of numerous subfields such as machine learning, which focuses on the development of programs that can teach themselves to learn, understand, reason, plan and act when exposed to new data in the right quantities. AI technology will supplement the smart factory towards networked factory, in which data from supply chains, design teams, production lines and quality control are linked to form a highly integrated and intelligent engines.”*

*Thus, it is apparent that different bodies have defined AI in various ways and these definitions are typically goal or purpose-specific. While it may be claimed that the lack of a precise and universally accepted definition of AI has contributed to the development of this field significantly as entrepreneurs enjoy freedoms to innovate; from a regulatory point of view, the definition of any term is crucial and in the absence of a clear definition, the whole purpose of regulation can be frustrated.*

### **Artificial Intelligence: Prospects and Challenges**

*AI is a general-purpose, enabling, purposive, transformative and emerging technology having the prospect to introduce epoch-making and far-reaching changes in almost every sector of human need, from agriculture to aviation, transport sector to healthcare, public safety and security to education. Globally, the use of AI applications can help to attain the United Nations Sustainable Development Goals (UN SDGs). Because of the prospects offered by AI applications, entrepreneurs have a tendency to project AI as a panacea for all problems. AI is also expected to have a significant economic impact. A research project conducted by Accenture Research and Frontier Economics in 2017 revealed that AI has the potential to boost profitability an average of 38% by 2035 and lead an economic boost of US\$14 trillion across 16 industries in 12 economies by 2035. PwC claimed that AI can add up to US\$ 15.7 trillion, the same as the combined output of China and India, to the global economy by 2030.*

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*It is also likely that AI will have a significant impact on the job market. For example, in the legal and judicial sector, researchers have successfully applied AI techniques. In 2016, researchers used AI techniques to study 600 judgments of the European Court of Human Rights and were able to predict final judgments with 79% accuracy. In the USA, by using AI techniques, researchers could predict court judgments with 70-83% accuracy. In contrast, legal experts were only able to make accurate predictions in 66% of cases.*

*Nevertheless, even with such strong accuracy rates, researchers confirmed that AI technology, in its present state, can neither replace human judgment nor be able to work as a substitute for lawyers. Therefore, at present, the recommendation is that AI applications should be used to assist human beings in reaching equitable judgments or decisions and should not instruct or dictate decision-making.*

*There are various technical, ethical and legal concerns raised by AI. First, the digital divide is an important concern. The successful and effective functioning of AI applications requires expert and trained human resource and adequate advanced computing powers. Currently, only developed countries and rich corporations can enjoy the benefits of sophisticated AI applications. Second, there is increasing evidence that given the current datasets available to AI applications, the use of AI can result in machine learning bias, also known as AI bias or algorithm bias. This may have negative results, such as the exclusion of certain segments of a population.*

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## **Technology Regulation**

*The word 'regulation' is generally used to mean the mechanisms by which governments and regulators monitor and control market activity and behaviour of the private sector in any economy. Regulations are essential to govern society, but the government should be careful about over-regulation or under-regulation. There is no 'one-size-fits-all' type of regulation and regulators select regulations based on the overall socio-economic policy considerations in a given context.*

*Regulations can be economic, social or administrative in nature. They can be of various types- (a) principle-based or outcome-based, (b) process-based or product based, (c) ex-ante or anticipatory or ex-post regulation, etc. Some regulatory tools e.g. industry self-regulation, enforced self-regulation, and command and control regulation are widely used to regulate the market. The relationship between innovation and regulation is complex, complicated and dynamic. In the case of emerging technologies, regulators face the added difficulty regarding the ideal time to interfere.*

Therefore, in the regulation of emerging technologies and their applications, the preference of anticipatory regulation, also known as principle-based regulations, is gaining popularity. In such types of regulation, instead of black letter specific legal rules, broad principles are set by regulators. This allows entrepreneurs to enjoy the freedom to develop their goods and services while keeping in mind the boundaries set by the principles. Anticipatory or principle-based regulation is both proactive and iterative and is able to respond to evolving markets. Principle-based regulations can operate across sectoral boundaries and the entrepreneurs do not face a significant barrier to enter the market. This type of regulation is innovation-friendly and is advocated as, after the ICT and internet revolution, the changes and pace of innovation seem to be beyond the control.

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### **Regulation of AI and Global Trends**

The regulation of AI is still in its infancy and countries around the world have started to consider regulatory responses to the various issues that arise from AI systems such as data protection and privacy, transparency, bias and anti-discrimination, human oversight, surveillance, public administration and services, autonomous vehicles, and lethal autonomous weapons systems, etc.

Interestingly, in the regulation of AI applications, it can be seen that principle-based regulation is preferred and all existing regulatory instruments to date have included principles such as principles on humanity, collaboration, share, fairness, transparency, privacy, security, safety, accountability, and long-term AI.

Globally, different countries, political organisations such as United Nations, EU, and technology giants such as Google, Amazon, IBM and Facebook have taken different initiatives to regulate burgeoning AI applications ranging from self-regulation to enactment of statutory laws. South Korea has already enacted municipal law i.e. the Intelligent Robot Development and Promotion Act. The EC has also initiated the review of national and EU frameworks to assess if existing legal frameworks are adequate to handle the challenges of AI applications.

Typically, in the first stage of regulation, a country will formulate its national policy, action plan, or strategy on AI, which contains provisions on the regulation of AI applications and the need to develop an ethical and regulatory framework for AI that will assist in the development of AI applications in a responsible manner based on the country's core values and principles. In 2017, Canada became the first country that launched such a national AI strategy. Closer to home, Singapore has established a national program on AI i.e. 'AI Singapore' in May 2017.

Unfortunately, Malaysia does not have any specific policy on AI though the previous government announced that it would develop a national AI Framework as an expansion of the existing National Big Data Analytics Framework. The present government formulated the National Policy on Industry 4.0 in 2018, where AI is listed as one of the enabling technologies and Malaysia Digital Economy Corporation Sdn. Bhd. has taken initiative to finalise the National Artificial Intelligence Framework by 2019.

In addition to the above, many countries have also established specific bodies to monitor and supervise the responsible and ethical development of AI applications. For example, Singapore has formed the Advisory Council on the Ethical Use of AI and Data, to advise and work with the relevant government authority on the responsible development and deployment of AI. United Arab Emirates has even appointed a Minister of State for AI. In March 2019, the Canadian Treasury Board Secretariat issued a Directive on Automated Decision-Making to ensure that AI driven decision-making is compatible with core administrative law principles i.e. transparency, accountability, legality, and procedural fairness.

One challenging aspect of AI regulation is management of personal data. AI applications can pose a significant threat to an individual's personal data. However, strict application of personal data protection law may make the functioning of AI applications difficult and ineffective.

Globally, personal data protection laws, which are also principle-based, require that personal data collected for one purpose cannot be used for another purpose, and every time personal data is used for a new purpose, the consent of the data subject is to be collected afresh. One may find such a situation more difficult after the entry into force of the European General Data Protection Regulation, which effectively sets a global standard of personal data protection as it has extra-territorial application. In addressing the challenge of AI bias, in the USA, a Bill titled "the Algorithmic Accountability Act, 2019" was introduced to direct the Federal Trade Commission (FTC) to require entities that use, store, or share personal information to conduct 'automated decision system impact assessments' and 'data protection impact assessments'.

If passed, organisations with annual revenue above US\$50 million, data brokers and businesses that hold data for over one million consumers would be required to conduct these assessments to proactively evaluate their algorithms to prevent inaccurate, unfair, biased or discriminatory decisions. Apart from these initiatives, it is a common trend that anticipatory or principle-based regulation is favoured in the case of regulation of AI applications. The OECD, being one of the most influential international organizations of the industrialised countries, has been playing a pivotal role in developing regulation for the sustainable and responsible development of emerging technologies.

The OECD has established an expert group on AI and recently, on May 22, 2019, OECD member countries have approved 'OECD Council Recommendation on Artificial Intelligence', the first intergovernmental voluntary and non-binding but highly influential standard on AI. OECD has identified five complementary values-based principles for the responsible stewardship of trustworthy AI:

1. AI should benefit people and the planet by driving inclusive growth, sustainable development and well-being.
2. AI systems should be designed in a way that respects the rule of law, human rights, democratic values and diversity, and they should include appropriate safeguards – for example, enabling human intervention where necessary – to ensure a fair and just society.
3. There should be transparency and responsible disclosure around AI systems to ensure that people understand AI-based outcomes and can challenge them.
4. AI systems must function in a robust, secure and safe way throughout their life cycles and potential risks should be continually assessed and managed.
5. Organisations and individuals developing, deploying or operating AI systems should be held accountable for their proper functioning in line with the above principles.

Similarly, the Beijing Academy of Artificial Intelligence, along with other stakeholders, has adopted the Beijing AI Principles. These organisations have agreed on 13 principles in three areas i.e. (a) research and development [Do Good, For Humanity, Be Responsible, Control Risks, Be Ethical, Be Diverse and Inclusive, Open and Share], (b) use [Use Wisely and Properly, Informed-consent, Education and Training], and (c) governance [Optimizing Employment, Harmony and Cooperation, Adaptation and Moderation, Subdivision and Implementation, Long-term Planning].

On the part of industry, tech-giants such as Google have also implemented a set of principles governing the use of AI. Google experimented with an external AI ethics panel to offer guidance on ethical issues. Besides this, Google has also published a list of AI applications which it will not pursue as they cause or may cause overall harm or injury to people violating widely accepted principles of international law and human rights, gather or use the information for surveillance violating internationally accepted norms. Within the EU, the AI HLEG has very recently developed the Ethics Guidelines for Trustworthy AI in April, 2019 to 'maximise the benefits of AI while minimizing its risks'. These Guidelines are believed to set the tone and direction of AI regulation. According to the Guidelines, trustworthy AI should be:

1. lawful - respecting all applicable laws and regulations;
2. ethical - respecting ethical principles and values; and
3. robust - both from a technical perspective while considering its social environment.

Additionally, the Guidelines have included 7 key requirements for AI systems to be deemed to be trustworthy. Thus, if an AI system can meet these 7 key requirements i.e. human agency and oversight, technical robustness and safety, privacy and data governance, transparency, diversity, non-discrimination and fairness, societal and environmental well-being, and accountability, then it will be treated as trustworthy AI. These Ethics Guidelines are addressed to all 'stakeholders' i.e. any person or organisation that develops, deploys, uses or is affected by AI. These Guidelines have included practical checklists that stakeholders can use when implementing AI into their organisations. Most importantly, these Guidelines are designed to foster discussion on an ethical framework for AI at a global level and are likely to be an influential reference document for policy and lawmakers around the world.

## Conclusion

Various AI applications have already proved to be very promising in solving many of the serious problems the world is facing. AI applications can be used to achieve UN SDGs and to make the world a better one. Some of these applications pose serious challenges too. The way entrepreneurs and various countries have been investing in the development of AI applications, UNESCO feels that an international regulatory instrument, at least in the form of Code of Ethics, is necessary. Though this will be a daunting task as there is no internationally agreed instrument on cyber law, the Ethics Guidelines for Trustworthy AI developed by the AI HLEG is the response with the ray of hope. For the time being, broad principle-based anticipatory regulations coupled with assessment tools or check lists should pave the way for countries to safely develop AI applications while considering more detailed mechanisms to regulate them.

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## ***References***

1. Malaysia Productivity Corporation, National Policy on the Development and Implementation of Regulations, July 2013.
2. Geoff Mulgan, Chief Executive Officer, Innovation Foundation (NESTA), <https://www.nesta.org.uk/blog/anticipatory-regulation-10-ways-governments-can-better-keep-up-with-fast-changing-industries/>.
3. Legg, Shane, and Marcus Hutter. "A collection of definitions of intelligence." *Frontiers in Artificial Intelligence and applications* 157 (2007): 17.
4. The Law Library of Congress, Regulation of Artificial Intelligence in Selected Jurisdictions, Global Legal Research Directorate, January 2019, available at <https://www.loc.gov/law/help/artificial-intelligence/regulation-artificial-intelligence.pdf>.
5. Linking Artificial Intelligence Principles, Research Center for Brain-inspired Intelligence, Institute of Automation, Chinese Academy of Sciences, <http://www.linking-ai-principles.org/>.

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