Briefing paper:

Artificial Intelligence: Why does it matter? What do policy makers in the TMT sector need to think about?

The Purpose of this Paper:

The sheer potential of the economic impact on global GDP of AI cannot be overestimated.

A recent report by PwC says that, based on current projections, global GDP is estimated at approximately $114 trillion by 2030. However, they suggest global GDP could be up to 14% higher than this figure in 2030 as a result of AI (the equivalent of up to $15.7 trillion)[1]. A recent McKinsey study suggests +16% growth in global GDP in the same time frame[2]. Whatever the reality, it is clear that AI is important, as discussions held within the IIC's journal and its events in the last year or so have shown. Key are the policy issues surrounding the use and developments of AI so that AI can be taken full advantage of for all stakeholders, and for economic and social growth.

Set against this is a heightened concern about how AI might be misused to negatively impact individuals, governments and industries. Many of the more recent, publicised concerns are based largely around ethical issues such as data rights and ownership; norms of privacy, transparency and accountability. Other longer-standing concerns are about the additional impact of AI on issues such as national security and human capital.

This briefing seeks to unpack some of the issues and is the first stage in a series of meetings across 2019 to enable policy makers to consider how best they can empower their communities to take advantage of the best of AI, while taking steps to safeguard against potential negatives. As with all IIC output the aim is to offer a forum for the exchange of ideas and information; we welcome your views, comments and, crucially, your involvement.

What is AI?

AI is a practical set of engineering techniques, many of which have been around for a long time, enabling machines to appear smart. AI can have a wide range of applications and is being used in analysis (as in automating repetitive tasks) and prediction (such as in language translation).

The types of AI that are present today are referred to as 'Narrow AI'. These systems perform well on specialised tasks in specific domains, such as personalised news article recommendations or credit fraud detection. They cannot, however, be applied generally across different domains. This would be the realm of 'Artificial General Intelligence' and, while a goal of AI research, is not a reality today and there is no evidence that researchers are close[3].

Many of the most promising recent developments in AI have taken place in a subfield called machine learning (ML), which is based on probability and statistics so that machine learning algorithms are trained on data to infer probabilities. For example, many medical processes now use machine learning to identify patterns in datasets which enable better, cheaper, and faster diagnoses. One of the most advanced and promising subfields of machine learning is deep learning. Like other forms of machine learning, deep learning involves learning from patterns in datasets, but structures the algorithms in layers to create an artificial neural network that can learn from errors on its own, with less intervention required by human trainers. Facial recognition is an example of deep learning.

What are the issues? Maximising the benefits

The BSA Foundation has provided useful examples of the ways in which AI is already bringing positive economic and social benefit to many industries, such as health (cited above) and agriculture.

At the start of this Paper reference was made to the way in which AI will contribute to global GDP. The PwC report quoted earlier suggests that both productivity and consumption will increase substantially, especially as repetitive tasks become increasingly automated and costs fall. The social benefits of increasing opportunities for education and a decreased dependence on physical movement (for trading for example) will bring increasing numbers of people into the common workforce. The report concludes '*that AI should be interpreted as an exciting source of wealth and*

job creation for the future, provided businesses and workers invest to adopt and adapt in order to meet the challenges AI will present, and take advantage of the opportunity'.

Many countries are gearing up for AI and across the region in Asia: governments are promoting the growth of AI in their economies, and some examples are cited here:

China is leading the way in investing in AI, committing, it is said, US$1 trillion into AI by 2030, while Chinese AI companies have attracted more than US$4.5 billion in investments in the last five years[4].

South Korea has set aside US$2 billion by 2022 to bolster its AI R&D capabilities as part of its AI development programme which has included the establishment of six new AI research institutes[5]. Five industries are to be concentrated upon: autonomous cars, IoT-fitted electronics, semiconductor and display, bio-health and renewable energy.

Japan's Ministry of Economy, Trade and Industry has earmarked ¥39.3 billion (US$347 million) for developing robot-related technologies and AI chips for next-generation computers, while the labour ministry has set aside ¥19.6 billion (US$173 million) for applying AI to medical data management and pharmaceutical research, this is for the fiscal 2018 budget alone[6].

In **Singapore** a national programme entitled AI Singapore brings together a number of institutions to both examine the challenges of AI but also to boost its capabilities, particularly in the areas of finance, city management solutions and healthcare[7]. Other initiatives are to partner with industry such as IBM[8] and to support STEM studies in schools.

In **Hong Kong**, the Government Chief Information Officer outlined a mentoring scheme made up of digital experts working with colleagues to develop more effective government working to the benefit of its citizens[9] .

What are the issues? Minimising the negatives

Apple CEO, Tim Cook, in a commencement speech to students at MIT in 2017 said: *"I'm not worried about artificial intelligence giving computers the ability to think like humans. I'm more concerned about people thinking like computers without values or compassion, without concern for consequences"*[10].

There are the more recent publicised concerns about how AI might be misused to negatively impact individuals, governments and industries, with questions raised about the impact of AI-driven processes on citizens (in turn impacting government), as well as notions of data rights and data ownership. Some examples of solutions and models being developed to counter these challenges are discussed below.

There are concerns about the impact of AI on jobs, for example, especially jobs requiring little specialisation and often involving repetitive tasks. These concerns are independent of AI technology however, and the future of work issues will be affected by any automation, and any change in the nature of employment that affects the economy. Nonetheless, examples of ways in which some countries are preparing for change in the future of work are given below.

What are the issues? Solutions being investigated

Ethical Issues:

At the IIC's 2018 Conference held in Mexico City, the Chairperson of the regulator in Taiwan described the national AI project as having five key principles:

1.   AI should be developed for the common good and wellbeing of all humans
2.   AI should be based on the principles of fairness
3.   AI should not be used to reduce privacy or the rights of individuals, families and communities
4.   Citizens have the right to be educated to enable them to develop mentally, financially and personally, through AI
5.   AI should never have the objective of affecting, hurting or deceiving humans.

The role of the regulator, she said, is to "DANCE" – an acronym to ensure there is full digital development, adaptability and agility, fostering a new mindset, guaranteeing cybersecurity and privacy, and always keeping an eye on ethics[11].

A number of the issues regarding the rights and ethics of AI applications can be related to two core characteristics of AI: (1) their autonomous nature; and (2) their reliance on data. Most AI techniques require big datasets in order to reveal patterns, make predictions, and execute actions, although developments suggest that the reliance of AI on these big datasets is likely to decrease in the future. Therefore, there are strong incentives for firms and nation states to collect and apply large datasets to optimise the performance of their AI applications. Related to this has been the concern about the use of personal data, though AI often permits the aggregation and anonymization of data in ways that are privacy-enhancing. The increasing use of on-device processing and federated learning will accelerate this trend.

There are calls for the development of good practice guidance to ensure that the benefits of AI can be maximised, and the negatives minimised. In Singapore the Personal Data Protection Commission has published a discussion paper on an accountability-based framework for AI, recognising that much of the development of AI will be based on sets of personal data[12]. In the consultation that underpinned the Paper, the PDPC said that two principles emerged:

1.   Decisions made by or with the assistance of AI should be explainable, transparent and fair so that affected individuals will have trust and confidence in these decisions
2.   AI systems, robots and decisions made using AI should be human-centric, i.e. the design approach should put the individual customer or consumer front and centre of the design of the AI deployment.

Similarly, Japan published guidelines for research and development in the AI field in preparation for the *Conference toward AI Network Society*. Importantly, the draft document is '*not intended to be regulation, but a set of non-binding AI R&D principles and guidelines regarding promoting the benefits and reducing the risks of AI*'[13]. The document sets out the following as 'basic philosophies':

●   Human-centered society
●   Share guidelines as non-binding soft law with stakeholders internationally
●   Ensure balance of benefits and risks
●   Avoid hindering technologies or imposing excessive burdens on developers
●   Review the Guidelines constantly and renew them as necessary

And is made up of nine principles. That of:

●   Collaboration
●   Transparency
●   Controllability
●   Safety
●   Security
●   Privacy
●   Ethics (respect human dignity and individual autonomy)
●   User assistance
●   Accountability

These principles of transparency, fairness and so on are echoed in other areas of the world – at the time of writing a consultation is underway in the European Union on guidelines for a 'Trustworthy AI'[14], and interdisciplinary groups are being created to address issues of ethics and governance[15]. What is clear is that there should be a framework of principles that can be applied to these global systems. A set of differing national policies may jeopardise the successful development and innovation capability of AI.

Models such as data minimisation and assurances (transparent processes) of anonymity should further reduce the concerns about the (mis) use of personal data.

Many of the models suggested also argue for assessment processes, to ensure that the practices put in place can be monitored to ensure they are working well, and the principles-approach described above allow for flexible, timely and effective reactions to concerns; as well as the move to on-device learning.

Industry also looks to these issues. As has already been mentioned, a defining feature of AI is its ability to learn from patterns in data, which presents a risk that it will replicate or even amplify unfair biases, to detrimental effect in areas such as recruitment or even crime prevention. Developers are aware of these possible biases and are working on many initiatives and research to address potential

bias in data, to better understand algorithms and to ensure a diverse workforce or, indeed, prevent inaccurate profiling of criminals.

There are principles set out for working with AI, such as fairness, inclusiveness, reliability and safety, transparency, privacy and security, and accountability (defined as algorithmic accountability)[16]. Other models describe the way in which AI systems should be designed, suggesting best practices in general and those that might be specific to machine learning[17].

Jobs: Upskilling and job creation:

The impacts of AI on labour markets are often reduced to a false dichotomy. On one side, Dystopians anticipate AI as leading to humanity's obsolescence; on the other, Utopians predict a productivity boom like we've never seen, allowing for work to become a choice rather than a necessity[18]. Technological change has always taken its toll in the short term but it has increased productivity and created – for most of the world – better living conditions through increased wealth, access to health facilities, food production and so on. To take advantage of the digital ecosystem, policymakers need to research how the future of work is likely to develop in their own economy. As stated at a recent IIC event, '*the impact of AI will be different in different geographies – to find out what skills gaps will become significant in the future*'.

It is in the emerging economies with relatively large populations of unskilled labour forces that there is the greatest concern of job displacement. In the Philippines, to cite but one example, which has a large population, government departments are working with private companies to develop training programmes that will, it is said, *'(Not be) AI replacing people, (but) it's now AI enabling our workers to perform better'*[19]. This model is repeated in many developing countries.

Conclusion
The IIC offers a platform for the sharing of information and this briefing paper is very much a summary of the issues facing regulators and governments as they seek to take advantage of the benefits that AI brings to their society and economy, preparing themselves for its evolution while ensuring that their populations are safeguarded from negative impacts. In turn it offers policy makers across industry a closer understanding of the key issues and how they can work with stakeholders to productively address concerns with a collaborative response, a willingness to adopt and encourage change where needed.

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