Artificial Intelligence and
the Future of Work

Professor Toby Walsh, UNSW Sydney
Submission to the Senate Select Committee on the "Future of Work and Workers".

Executive summary
- Predictions that around half of all jobs at risk of automation in next couple of decades need to be treated with caution.
- Nevertheless, technologies like AI and Robotics will create significant disruption to the nature of work.
- We can identify many skills and jobs that will likely be safe for automation that can help direct policy.
- AI will impact not just work but every sector of the economy (private, public and voluntary). Many of the leading nations around the world have drawn up national AI plans. Australia needs one urgently otherwise it risks falling behind.

Jobs at Risk:
Many fears about job displacement can be traced to a 2013 study from the University of Oxford by Frey and Osborne on the impact of automation. This made a much quoted prediction that 47% of jobs in the US were under threat of automation in the next two decades. Other more recent and, in some cases, more detailed studies have made similar dramatic predictions for the US as well as other economies including that of Australia. However, the conclusions of even the most careful of these studies need to be treated with caution.

There are many factors typically not considered by such studies (e.g. new jobs created by technology, new jobs created via economic growth brought about by technological change, jobs that we can be automated that we choose not to automate, the impact of changing demographics, reduction in the length of the working week). In addition, if one looks closely at the data, clear errors are visible. For instance, Frey & Osborne predict with high probability that bicycle repairperson, model and pilot will all be automated in the next two decade. The first prediction is technical very unlikely (repairing bicycles would be a difficult and demanding job for a robot), the second misses the point (we don't care what robots look like in clothes), and the third ignores society's acceptance of change (we could automate flying a plane but we will probably prefer to have a human pilot even if much of their job is automated).

Nevertheless, technologies like Artificial Intelligence and Robotics with create a large disruption in work. There are many parts of jobs that will be automated in the near future for the first time, and it won't just be blue collar jobs that are at risk. Even high skilled jobs like radiologist will be impacted. It is already clear that there are some jobs like taxi and truck driver where it will be far safer and far cheaper for machines to do them. A few edge cases (e.g. negotiating road works) will not keep humans employed as drivers. Only a small percentage of drivers currently employed today will be needed to drive remotely when an autonomous vehicle cannot proceed safely on its own. Any taxi or truck driver should be asking themselves the question: "What other skill besides driving do I have that people will be willing to pay for?"

Jobs of the Future:
We can already identify many skills and jobs that will likely be safe from automation, an important step in creating policy that prepares for this future of work. A "triangle of opportunity" emerges from this analysis. At the top apex are technology jobs, inventing the future. There is a future in inventing the future. However, not everyone needs to be a coder. Indeed, there will be limited opportunities for coders when computers can, as they will be able to, code themselves. There are, however, quite different opportunities at the other corners of the triangle. At one of the bottom corners are jobs requiring people skills. Computers have limited emotional and social intelligence, and are likely to have so for a long time. And even when they do, we will simply prefer interacting

with people compared to machines. Teachers, nurses, general practitioners, and salespeople are, for example, all likely to be relatively safe from the tide of automation. The third and final corner of the triangle represents artists and artisans. Computers have limited creativity, and are likely to have so for a long time. And again, even when we have figured out how to make computers to be creative, we will prefer things made by humans, that speak to the human experience, that can't be mass produced. Ironically, one of the safer jobs on the planet is one of the oldest, carpenter.

Policy implications:
These changes suggest a number of policy responses. First, it is clear that the jobs of the future will require different skills to many of the jobs being done today. And many of the skills for the jobs of the future will involve technologies yet to be invented. Therefore these are not skills that can be taught directly at school or university now. An appropriate policy response then might be to support lifelong learning (e.g. incentives to the individual and to industry to re-skill), as well as to adapt the curriculum to support this (e.g. learning to learn, teaching robustness & adaptability). Second, we need to re-consider the safety net provided to those put under pressure by technological change. This happened with the Industrial Revolution when we invented trade unions, labour laws, and the welfare state. We may need to consider potentially radical changes like universal basic income, or negative tax rates to provide that support. Third, we need to ensure that the productivity benefits provided by automation are shared. At present, gains are being concentrated into the hands of a few rich individuals and corporations. Australia's "Google Tax" is an example of the new sort of policy needed to ensure that inequality does not increase, and the benefits of technological change are shared across society. Fourth, there are a number of groups within society at especial risk. Indeed, if we are not careful, technology may increase racial, gender, age and others forms of discrimination in the workplace. This requires significant policy response. Finally, the threat posed by countries like China cannot be ignored. China has a clear intention to lead the world in AI by 2030. It is betting its economic (and military) future on this. Digital marketplaces often lead to natural monopolies. Without suitable response and coordinated policy, the benefits of AI will flow out of Australia into those countries winning this race.

Conclusions:
The impact of AI will be felt not just within the world of work. It will touch almost every aspect of society: defence, education, taxation, trade, transport, health, and leisure, to name just a few. Almost everything that government does will need to adjust. This needs a coordinated response. A number of leading nations already have an AI plan in place (e.g. US, China, UK, South Korea, Canada). Australia will fall behind if it doesn't make such a plan and start acting on it. Carpe Diem!

Biography:
Toby Walsh is Scientia Professor of Artificial Intelligence at the University of New South Wales. He has been elected a Fellow of the Australian Academy of Science and the Association for the Advancement of Artificial Intelligence. He has won the NSW Premier's Prize for Excellence in Engineering and ICT. His new book, "It's Alive!: Artificial Intelligence from the Logic Piano to Killer Robots" covers many of these issues in greater depth.