

HOW WELL DO YOU GET ALONG WITH YOUR ROBOT?

Automation and our jobless futures

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THE CHALLENGING FORECAST

A recent report by the Foundation for Young Australian provides three dramatic forecasts for 2030. These are: ⁱ

- *44 per cent of jobs will be automated in the next 10 years*
- *60 per cent of students are chasing careers that won't exist*
- *Young people will have an average of 17 different jobs*

In a similar vein, the World Economic Forum forecasts in its report, *The Future of Jobs* that forecasts that five million jobs will disappear because of automation.ⁱⁱ Not just factory jobs, but office workers as well as professionals in law and accounting will also be hit. McKinsey and Co assert that 45% of "today's workplace activities could be done by robots".ⁱⁱⁱ In Australia, The Committee for Economic Development in Australia argues that 60% of all jobs in rural and regional Australia are at risk by 2030.^{iv}

BACK TO THE 1990S

While forecasts like these are normally reserved for predictive futurists, the dramatic nature of disruption that the world has experienced the last twenty years has made change the norm. If we go back twenty years ago to the early 1990s, a number of significant changes were just commencing that have been instrumental in creating the world we live in today. These included:

1. The fall of the Berlin wall, the breakdown of the Soviet Union and the eventual integration of much of Eastern Europe into the European Union.
2. The beginning of the worldwideweb creating a world where the pivotal issue today is the virtual entering the material world - "leaving the screen", the creation of the internet of things, persons and systems - the full digitization of information and the perhaps the realization of the hundred year dream of the HG Wells: *The World Brain*.^v
3. The beginning of the human genome project, creating a world where prevention becomes the norm and every Australian born in 2025 could receive a full life map of personalized genetic risk factors.

4. The rise of China (and to some extent India), with China moving from a peripheral global economic player - from twenty billion in foreign reserves to nearly four trillion ^{vi}and rapidly becoming the largest economy in the world.

5. The beginning of ageing throughout the Western world and East Asia, leading to a number of issues, including depopulation with entire European villages for sale for under 100,000 euros, ^{vii} lifelong learning, and the quite dramatic shift from there being enough young people to pay for the pensions of the aged, to there being a lack of young people to pay for pensions. The lack of young people impacts not just the superannuation formula (the worker-retiree ratio) but decreasing enrollments in the education sector, among other factors.

6. The beginning of what we now call international terrorism with the Arab CIA recruits eventually becoming Al-Qaeda, uniting with the Taliban, and further disruptions in Iraq and Syria leading to the rise of *Daesh*. The result of the inability of finding a geopolitical solution in Syria, leading to the largest refugee crisis in Europe since World War Two; indeed, calling into question the entire European project. With Russia active player in the conflict in the Middle-East, we can easily anticipate Afghanistan 2.0.

7. The 90s also began the great boom - from globalization, from the peace dividend, and from the imagination of the "end of history," of the end of social and political conflict. But history as it turned out would not end, instead, a global financial crisis resulted, caused by

- A. The shift of the world economy to China,
- B. Disintermediation created by the new digital and robotic technologies,
- C. The shift from coal and oil to the new renewables,
- D. Lack of global and national regulation of financial institutions, and,
- E. Speculative bubbles in housing.

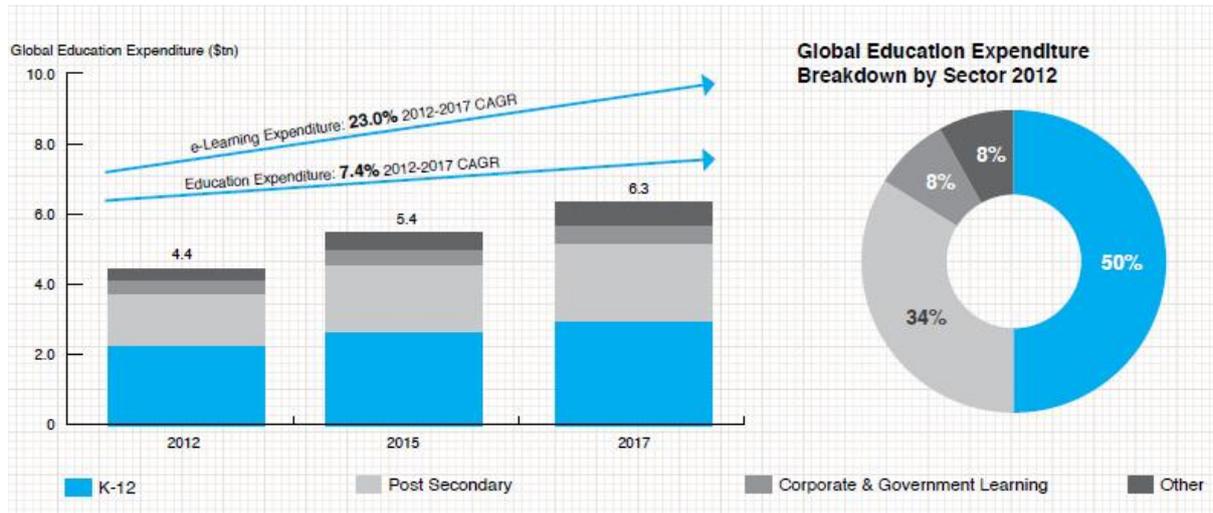
The result for national education policy has been a shift from education as an investment to education as an expense. Governments throughout the world have reduced their expenditures in education, as they deal with increased social security costs (an ageing society) and security costs (from the reality and the imagination of international terrorism). ^{viii}

To deal with the new reality of decreased government subsidies, in 2015, universities find themselves moving toward virtual learning with the intention of having more students with reduced labour costs, and continuing to expand to new areas -the emerging markets where the demand for education is insatiable. ^{ix} At the same time, to deal with drop in government funding, the workforce is undergoing casualization, with more being demanded for less. ^x In Australia, "casualization" is now 60 percent of the higher education workforce (Luyt et al., 2008). ^{xi} Comparing the university to the garment industry, Patricia Kelly calls casual lecturers "piece workers of the mind" (Kelly, 2011). ^{xii}

THE NEXT TEN YEARS

These trends are unlikely to stop in the next ten years. ^{xiii} The number of students enrolled in higher education, for example, is likely to double to 262 million by 2025, with most the growth in

developing nations such as India and China.^{xiv} Over 8 million of these students will travel to other countries.^{xv} The market size for global education was 2.5 trillion dollars in 2011^{xvi} and is now 4.4 trillion us dollars. It is expected to continue to grow with e-learning projected to grow by 23%.^{xvii}



We can thus expect more digitalization and virtualization (and with holograms and virtual technology) far more high-tech-soft touch experiences. We can also expect the continued globalization of education with providers at high school and university levels coming from all over the world, competing for the student dollar. Major disruptions are likely. Perhaps it will as with uber, airbnb, snaggoods^{xviii} and other aspects of the sharing economy, where formal providers - the universities - are disrupted by peer-to-peer app based networks. The means a world where learning is where you want it, when you want it, how you want it, and at a cheaper cost.

Education may also be disrupted by the major players - Alibaba, Google, Facebook - who could offer degree courses not just for employees or training but doctoral courses. Of course, national accreditation remains the barrier. While this barrier may be feudal, the debate in the next ten years will be can it be broken, can the castle walls of the university be breached by the new tech "bedouins"? They may be innovators or barbarians, but the castle will be challenged.

And, youth expect this to be so. Having grown up in a digital environment where the user and connectivity adds value, these digital natives are likely to be in positions of executive power throughout the world by 2025-2030. While there are always pendulum shifts to the "good old days" of the industrial era, in 15 years ipads and iphones will not be considered new technologies, but like chairs and tables, part of the infrastructure, of what is expected.^{xix}

But which jobs are least likely to be automated? According to a recent article by the website Planet Money,^{xx} "mental health and substance abuse social workers" are least like to be replaced as the work involves "cleverness, negotiation, and helping others." As well elementary school teachers are extremely unlikely to be roboticized, while librarians have higher than a 50% chance to be

automated. However, as digital natives come to power, the odds for automation are likely to increase (not to mention the pressures from globalization). Moshe Vardi, Director of the Institute for Information Technology at Rice University, asks if we are prepared for " a global economy ...with 50% unemployment."^{xxi} Ten percent of American jobs will disappear due to driverless cars, to begin with. And as automation spreads through the entire economic system, no profession will be safe.^{xxii}

But this type of analysis assumes a straight line trend projection, but as there are many uncertainties with respect to the growth of artificial intelligence and our response, we need to explore not the future, but alternative futures.

ALTERNATIVE FUTURES

Four possible scenarios are likely.

Scenario title	Teach and Train for the 1950s.	Add a few courses.	Teach and train for emerging industries.	Teach and Train for a world after jobs.
Systemic change	No curriculum change.	Minor curriculum change.	Focus on emerging futures-major curriculum change.	Focus on meaning and purpose with multiple forms of intelligence.
Worldview	The Industrial era continues.	Muddling through.	Forecast and Adapt	Post-Digital.
Core myth/metaphor	"Teaching for jobs that no longer exist?"	"Too little too late."	"We add value"	"Strangers in a strange land."

(1) Teach and train for the 1950s.

In this future, educators assume youth - high school and university students - will have one job, one career and live in one nation. Focused on the past successes and mired down by party politics, Australia is unable to shift to a post-industrial economy. Already Australia is ranked a lowly 48 for average internet speed and 60 during peak periods.^{xxiii} For students and teachers, it will be like living in a prison cell (wasting their time, and when they are free, they will be irrelevant). As the economy shifts, large sectors will disappear. The story line would be: "teaching for jobs that no longer exist." As William Bossert, a Harvard Professor who taught computer sciences in the 1970s, recently commented: "If you're ^{xxiv}afraid that you might be replaced by a computer, then you probably can be and should be." Dystopian images of the "last job on Earth" ^{xxv}and riots against the new technologies are likely. However, it is worthwhile remembering that prior to the alarm clock, "knocker-uppers" woke up factory workers by banging on bedroom windows. Transitions to new economic eras are fraught with challenges. Transitional strategies are crucial.

(2) Add a few courses on coding and Asian languages.

In this future, through national broadband networks, the speed of access to information changes, but there is no real change in social infrastructure. Academic hierarchy continues. Classrooms remain ordered in rows. Knowledge is about repeating information. The story line would be: “too little, too late”. For students, they will face a disconnect between virtual world/peer-to-peer networks and the formal industrial educational system. They will be physically in class, but mentally far away.

(3) **Teach and train for emerging industries.** In this future, high schools and universities, indeed, the entire educational system, teaches for the current emerging futures. Retraining is crucial as it was in the shift from agriculture to industrial. For example, farming throughout the developed world was once the largest labour source. In the USA, technological advancements in farming have reduced labour from "10 million in 1950 to 3 million in 2010." ^{xxvi} "Similarly, back in 1901, 200,000 of England and Wales's 32.5 million people were employed in the clothes-washing business, and by 2011, just 35,000 in a population of 56.1 million are flying the launderers' flag."^{xxvii}

We are in the midst of a similar structural change to the next economic revolution. The curriculum will likely be focused on the following areas: ^{xxviii}

- Robotics
- Bio-informatics
- Peer to peer
- Care for ageing
- Meditation and emotional intelligence
- Software design
- City design
- 3d printing
- The internet of everything
- Solar and wind energy, including smart houses and cities

For example, just recently a young woman advertised on craigslist in New York to become a pokemon go trainer at 20 usa \$ per hour. She would find the pokomon's for you, train you, and do everything else required for the virtual-reality game.

Teaching will be focused on preparing futures not just for the new jobs but in a world where many traditional jobs will disappear. The focus will be on teaching flexibility as some students will have portfolio careers - what they can do, not positions held - and multiple careers (changing careers every few years). Some will stay focused in one area, but many will wander innovating to create new types of work. Technology will create new categories of jobs, some unimaginable through today's lenses.

The tag line for this future is: “We add value.” Students find their needs meet, they are excited about education and blend easily between formal high school and university and their own virtual peer to peer learning frameworks. The value added is not problem solving as computers can do that with ease, but with defining the problem and with being alert to how the nature of the problem keeps on shifting, that is, we are embedded in complex adaptive systems that change as we intervene in the system, as we solve the problem. The fourth future is more radical and imagines a world after jobs.

(4) **Teach and train for a world after jobs.**

This future takes the forecast by the Foundation for Young Australians seriously concluding that the emerging efficiency, collaborative and sharing economy will likely dominate by 2030. Robotics, the internet of everything and major disruptions will make education no longer about jobs but about purpose, adaptability and meaning.

Techno-optimists argue that smart machines will dramatically economic surplus so "that we could collectively afford to liberate much of humanity from both labour and suffering."^{xxxix} With labour transformed, knowledge passing on between generations will not be data based but about the sharing of emotional, spiritual and new forms of intelligence. Says Meg Bear, Vice-president of Oracle, "Empathy is the critical 21st-century skill."^{xxx} Indeed, the main issue will be: "how well do you get along with your robot."^{xxxi} As AI is best suited for standardized work, performance is not about being like a "lean machine," but as "good at being a person. Great performance requires us to be intensely human beings," argues Geoff Colvin in his new book, *Human are Underrated*. Value comes from the ability "to build relationships, brainstorm, collaborate, and lead."^{xxxii} The shift would be not just from the current corporate model to the sharing economy - Uber - but creating platform cooperativism where drivers own the business - cooperation. Productivity will likely be higher as there is enhanced buy-in. So it is not really the "gig" economy as many argue (a recent report suggests that 40% of U.S. workers will be independent contractors or freelancers by 2020)^{xxxiii} - but a true cooperative economy. Of course, with disintermediation, some sectors will likely be run by large state or corporate actors who can control because of the economies of scale. But the boom will be in platforms that create new value through cooperation. This leads to greater equity and productivity.

BREACHING THE CASTLE

However, if we are not careful inequality could spike even more where the owners of robots accrue all the profits and the rest live in a state of fear and despair - perpetual job anxiety. Safety and security is a must. This can emerge from a basic universal income^{xxxiv} - this ensures that survival is taken care of so that individuals can focus on "thrival". Already a number of countries, for example, Finland are beginning to experiment with a universal income.^{xxxv} "The Finnish government is currently drawing up plans to introduce a national basic income. A final proposal won't be presented until November 2016, but if all goes to schedule, Finland will scrap all existing benefits and instead hand out 800 Euros per month—to *everyone*."^{xxxvi}

If developments in robotics continue and universal basic income becomes the planetary norm, it would be a post-scarcity world, where current - 2015 - way of acting and being would be disadvantageous. The tag line for this scenario is: "strangers in a strange land.

Students will find this world both exciting and threatening. Exciting as it opens up many possibilities, but threatening in that they will need to adjust to and create new forms of physical and knowledge infrastructure. The future will be truly unknown.

Education would have been disrupted in this scenario. The castle would have been breached. The knights - the professors - could go back to what they truly love - reflecting, learning, teaching, and the creation of new knowledge.

Would it become an ecological playground? Perhaps. But once the moat goes down, it is unclear what will emerge afterwards. Perhaps the villagers outside the castle walls may storm inside, or perhaps they will welcome the new global brain.

We shall see. In the meantime, believing that tomorrow will be like today is a precursor to obsolescence.

ⁱ <http://www.abc.net.au/news/2015-08-24/next-generation-chasing-dying-careers/6720528> - foundation for young australians. Accessed 1 September 2015. For the full report, see: <http://www.fya.org.au/wp-content/uploads/2015/08/fya-future-of-work-report-final-lr.pdf>. Accessed 3 October 2015.

ⁱⁱⁱ <http://reports.weforum.org/future-of-jobs-2016/>. Accessed 2 April 2016.

ⁱⁱⁱ Bryan Dean Wright, "Terminated: beware of job-killing robots," *Sydney Morning-Herald* (30 March 2016). <http://www.smh.com.au/business/workplace-relations/terminated-beware-of-jobkilling-robots-20160330-gnu7t0.html>. Accessed 4 April 2016.

^{iv} <http://theconversation.com/australia-must-prepare-for-massive-job-losses-due-to-automation-43321>. Accessed 2 April 2016.

^v Well, H.G, (1938) *The World Brain*. New York: Doubleday.

^{vi} <http://www.chinability.com/Reserves.htm>. Accessed 3 October 2015.

^{vii} <http://www.theguardian.com/world/shortcuts/2014/mar/10/for-sale-spanish-village-free-right-owner>. Accessed 3 October 2015. <http://www.npr.org/sections/parallels/2015/08/23/433228503/in-spain-entire-villages-are-up-for-sale-and-theyre-going-cheap>. Accessed 3 October 2015.

^{viii} For more on this, see: Inayatullah, S. (2012). "University futures: Wikipedia University, Core-periphery reversed, Incremental Managerialism or Bliss for all," *On the Horizon*, (Vol. 20, No. 1), 84–91.

^{ix} For more on the higher education demand, see:

http://www.britishcouncil.org/sites/default/files/the_shape_of_things_to_come_-_higher_education_global_trends_and_emerging_opportunities_to_2020.pdf. Accessed 3 October 2015.

^x Whyte, S. (2011), "Aging academics set university time bomb", *The Sydney Morning Herald*, 16 January, available at: www.smh.com.au/national/ageing-academics-set-university-timebomb-20110115-19ry1.html. Accessed 24 January 2011.

^{xi} Luyt, B., Zainal, C.Z.B.C., Mayo, O.V.P. and Yun, T.S. (2008), "Young people's perceptions and usage of Wikipedia", *Information Research*, Vol. 13 No. 4, December, available at: <http://informationr.net/ir/13-4/paper377.html>. Accessed 6 October 2011.

^{xii} Kelly, P. (2011), personal communication, 25 January.

^{xiii} http://www.ey.com/AU/en/Industries/Government---Public-Sector/UOF_University-of-the-future. Accessed 6 October 2015.

^{xiv} <http://www.universityworldnews.com/article.php?story=20120216105739999>. Accessed 6 October 2015.

^{xv} <http://www.universityworldnews.com/article.php?story=20120216105739999>. Accessed 6 October 2015.

^{xvi} <http://www.edarabia.com/15179/>. Accessed 6 October 2015.

^{xvii} http://blogs.edweek.org/edweek/marketplacek12/2013/02/size_of_global_e-learning_market_44_trillion_analysis_says.html. Accessed 6 October 2015.

^{xviii} <http://www.forbes.com/pictures/eeji45emgkh/airbnb-snapgoods-and-12-more-pioneers-of-the-share-economy/>. Accessed 10 October 2015. <http://www.economist.com/news/leaders/21573104-internet-everything-hire-rise-sharing-economy>. Accessed 10 October 2015.

^{xix} <http://edition.cnn.com/2012/12/04/business/digital-native-prensky/>. Accessed 10 October 2015.

^{xx} http://www.npr.org/sections/money/2015/05/21/408234543/will-your-job-be-done-by-a-machine?utm_content=bufferdf8ca&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer. Accessed 31 January 2016.

^{xxi} <http://phys.org/news/2016-02-intelligent-robots-threaten-millions-jobs.html>. Accessed 15 February 2016.

^{xxii} Ibid.

^{xxiii} Spandas Lui, "A non-sensationalist look at Australian internet speeds," *The Sydney Morning-Herald* (25 March 2016). <http://www.smh.com.au/technology/innovation/a-nonsensationalist-look-at-australian-internet-speeds-20160325-gnr0p7.html>. Accessed 2 April 2016.

^{xxiv} Geoff Colvin, "Human are Underrated," *Fortune.com*, (No. 10), 1 August 2015, 45.

^{xxv} <http://www.theguardian.com/sustainable-business/video/2016/feb/17/last-job-on-earth-automation-robots-unemployment-animation-video>. Accessed 2 April 2016.

^{xxvi} Jason Hiner, "When robots eliminate jobs, humans will find better things to do," ZDNet. <http://www.zdnet.com/article/when-robots-eliminate-jobs-humans-will-find-better-things-to-do/>. Accessed 2 April 2016.

^{xxvii} Bec Crew, "Technology has created more jobs than it's destroyed in the past 140 years," Science Alert (21 August 2015). <http://www.sciencealert.com/technology-has-created-more-jobs-than-it-s-destroyed-in-the-past-140-years>. Accessed 4 April 2016.

^{xxviii} <http://www.fastcompany.com/3058422/the-future-of-work/these-will-be-the-top-jobs-in-2025-and-the-skills-youll-need-to-get-them>. Accessed 2 April 2016.

^{xxix} Lydia Lim, "Fair wage for workers in age of robots," <http://www.straitstimes.com/opinion/fair-wage-for-workers-in-age-of-robots>. Accessed 1 April 2016.

^{xxx} quoted in Geoff Colvin, "Human are Underrated," *Fortune.com* (No. 10), 1 August 2015, 45.

^{xxxi} Anne Fisher, "Could you be replaced by a thinking machine?" <http://fortune.com/2015/11/01/artificial-intelligence-robots-work/>. Accessed 2 November 2015.

^{xxxii} Geoff Colvin, "Human are Underrated," *Fortune.com*, (No. 10), 1 August 2015, 46.

^{xxxiii} <http://qz.com/65279/40-of-americas-workforce-will-be-freelancers-by-2020/>. Accessed 2 April 2016.

^{xxxiv} <http://www.basicincome.org/>. Accessed 15 February 2016.

^{xxxv} Tim Worstall, "Finally, someone does something sensible: Finland to bring in a universal basic income." <http://www.forbes.com/sites/timworstall/2015/12/06/finally-someone-does-something-sensible-finland-to-bring-in-a-universal-basic-income/#5c3e110d76f6>. Accessed 1 April 2016.

^{xxxvi} <http://marginalrevolution.com/marginalrevolution/2015/12/a-guaranteed-annual-income-for-finland.html>. Accessed 1 April 2016.