

Technology is a really interesting investment theme at this time.

25/3/15 for clients of Puzzle Financial Advice - EARLY DRAFT – Not proof-read

Why?

Technological change is occurring at an exponential rate and is rapidly transforming our lives and our investments. On the one hand, it will bring about dramatic societal disruption, but it will also drive far greater productivity. Some industries will undergo dramatic upheavals and change, where long-time industry leaders are supplanted by disruptive up-starts. Those companies that can effectively harness technological change, can potentially dramatically boost profits.

Who will the winners be?

- Global multinationals who have the resources & skills to invest in new technologies, to drive productivity and to innovate.
- New disruptive companies that harness new technologies to supplant incumbents.
- Technology companies that supply key ingredients bring about technological change.
- The emerging world.
 - Broadly, I think that the developed world will try to resist technological change, just like for example, most of Europe is resisting the economic reforms required to adjust and adapt to the global changes being forced by the developing world. (Ref: Warwick McKibbin, AFR 16/3/15)
 - Changes needed include labour market deregulation, fiscal reform.
 - By contrast, the developing world has almost nothing to lose by “going-for-broke” with the new technologies, as it will simply accelerate their economic growth.
- Certain sectors in the developed world that are part of the technology revolution in some form.

Who will the losers be?

- Companies that do not innovate and adapt to change quickly enough.
- There is likely to be high unemployment in the developed world because of the pace that technology will displace jobs.
- Developed world countries that do not adapt quickly to the new global realities. There are interesting parallels between now and the period of fall of communism (1989-1992). The West thought this would herald a great period of peace and prosperity, but instead this heralded a new phase of globalisation, helping the emerging world to emerge, bringing with it a new phase of very-intense international competition.

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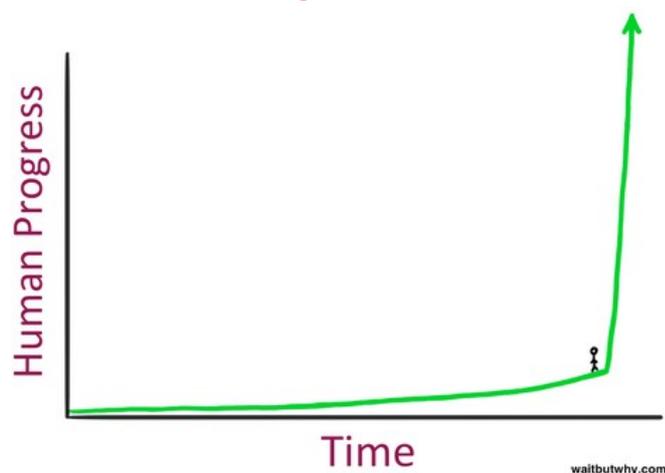
Background on some of what is happening in technology.

- Why?
 - **We are at the early stages of the third industrial revolution.**

- Technology is now accelerating at an incredible rate.
 - This set of technologies, is combining to drive incredible innovation.
 - Plummeting computing costs
 - Plummeting computer storage costs
 - Plummeting telecommunication costs
 - Very low cost sensor technology
 - Beneficiary technologies
 - Robotics & advanced manufacturing
 - Artificial intelligence
 - Medicine including pharmaceuticals
 - Smart electricity grids
 - And this will all help new forms of energy including renewable energy, to become a reality.
 - Genomics etc etc etc
- http://puzzlefinancialadvice.com.au/150223_DavidBrown_presentation_-_the_3rd_Industrial_revolution.pdf
- **Avalanche of human brain-power to accelerate technological change**
 - Very low cost computing & telecommunications + international language (English) + free knowledge on the Internet is just **starting to unleash an avalanche of human brain-power to accelerate technological change.**
 - For example, DataWind in India sells a 7inch Android table for about \$40.
 - [http://puzzlefinancialadvice.com.au/130712_AFR_\\$60_tablet_computers_revolutionises_Indian_society.pdf](http://puzzlefinancialadvice.com.au/130712_AFR_$60_tablet_computers_revolutionises_Indian_society.pdf)
 - 'As the cost of devices drops and internet access becomes universal, we are witnessing a new kind of revolution.'
 - 'Now, however, people are more connected. *Those in the poorest parts of the world are gaining access to an equivalent breadth of knowledge as those in the wealthiest parts. They are beginning to participate in the global economy, to learn from others, and to solve their own problems.*'
 - 'The next step in this revolution is cheap tablets. India recently launched the Aakash tablet, which provides all the features of more expensive tablets.'
 - 'To add to the increasing accessibility of technology and its benefits, India has launched an initiative to connect 250,000 villages via optical fibre cable. The fibre-optic lines will provide cheap, affordable internet. *Regardless of whether the government delivers on these plans, India's cell phone carriers already provide affordable data plans.* Newer versions of Datawind tablets, or "phablets" as they are colloquially referred to, *have cell phone capabilities and come with unlimited web access for Rs.100 (US\$1.75) per month.*'
 - 'The Indian government has inadvertently started a revolution that will transform India and shake up the world. It has lowered the expected base price of tablet technologies to a range of \$35 to \$50. Chinese vendors are competing with Datawind to bring production costs below \$35.'
 - I believe this is part of a massive world-changing event that will have a **massive impact in the emerging world, making education, knowledge, (& ability to make money) much more accessible to billions more people.** "Empowerment through knowledge". It strikes me that this will help fuel another wave of emerging-world competition on the West - possibly

highly deflationary. This also seems like a major democratising force, which seems to be starting to reduce corruption in India (and undoubtedly elsewhere), and is increasingly a means of holding politicians more accountable. Cheap, small, web-capable computers are rapidly changing the world.

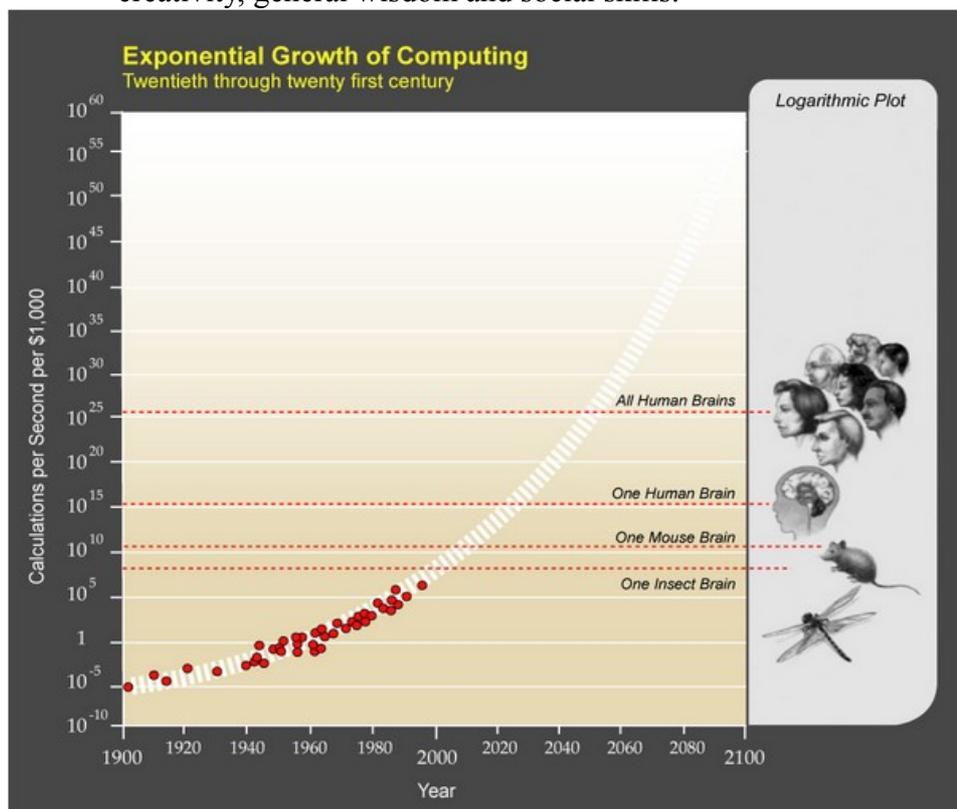
- Of course, there is an even bigger issue here. This historic emergence event, where the BRICS and Next-11 etc are experiencing a few decades of massive economic development has only been made possible by the technologies of affordable high-speed internet (enabling service providers in the emerging world to compete directly for jobs in the developed world) and affordable fast and efficient international transport systems (air and sea) to compete directly for manufacturing jobs in the developed world. So **technology is central to the most rapid period of change that probably has ever been seen**. The rapid decline in the price of internet-enabled computing technology, to empower the poorest peoples in the developing world, is just part of that **much bigger historic emergence event**.
- Other references:
 - http://puzzlefinancialadvice.com.au/130712_AFR_chips_for_tablet_computers_falling_very_fast.pdf
 - <http://www.smh.com.au/digital-life/computers/new-version-of-worlds-cheapest-tablet-unveiled-20121112-29943.html>
 - <http://www.smh.com.au/digital-life/digital-life-news/india-unveils-35-tablet-computer-for-rural-poor-20111005-1lao.html>
 - <http://qz.com/32033/a-look-inside-the-worlds-cheapest-tablet-computer-indias-20-aakash-2-video/>
- **Artificial Intelligence (AI) is starting to mature.**
 - Made possible by the other technological changes above.
 - A snapshot on AI.
 - <http://waitbutwhy.com/2015/01/artificial-intelligence-revolution-1.html>
 - 'We are on the edge of change comparable to the rise of human life on Earth. — Vernor Vinge'



- 'If Kurzweil and others who agree with him are correct, then we may be as blown away by 2030 as our 1750 guy was by 2015—i.e. the next DPU might only take a couple decades—and the world in 2050 might be so vastly different than today's world that we would barely

recognize it.'

- i.e. The multiple of technological change in the next 15 years might be as much as the amount technology multiplied over the last 265 years.
- 'In 1993, Vernor Vinge wrote a famous essay in which he applied the term to **the moment in the future when our technology's intelligence exceeds our own — a moment for him when life as we know it will be forever changed and normal rules will no longer apply.'**
- 'There are three major AI caliber categories:
 - AI Caliber 1) Artificial Narrow Intelligence (ANI): Sometimes referred to as Weak AI, Artificial Narrow Intelligence is AI that specializes in one area. There's AI that can beat the world chess champion in chess, but that's the only thing it does.
 - AI Caliber 2) Artificial General Intelligence (AGI): Sometimes referred to as Strong AI, or Human-Level AI, Artificial General Intelligence refers to a computer that is as smart as a human across the board—a machine that can perform any intellectual task that a human being can.
 - AI Caliber 3) Artificial Superintelligence (ASI): Oxford philosopher and leading AI thinker Nick Bostrom defines superintelligence as “an intellect that is much smarter than the best human brains in practically every field, including scientific creativity, general wisdom and social skills.”'



- 'So on the hardware side, the raw power needed for AGI is technically available now, in China, and we'll be ready for affordable, widespread AGI-caliber hardware within 10 years.'
- <http://waitbutwhy.com/wp-content/uploads/2015/01/gif> – Click on this link to see how technology will change.

- 'What we do know is that humans' utter dominance on this Earth suggests a clear rule: with intelligence comes power. Which means an ASI, when we create it, will be the most powerful being in the history of life on Earth, and all living things, including humans, will be entirely at its whim—and this might happen in the next few decades.'
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- <http://waitbutwhy.com/2015/01/artificial-intelligence-revolution-2.html>
 - 'Kurzweil believes computers will reach AGI by 2029 and that by 2045, we'll have not only ASI, but a full-blown new world—a time he calls the singularity. ... **Kurzweil's depiction of the 2045 singularity is brought about by three simultaneous revolutions in biotechnology, nanotechnology, and, most powerfully, AI.'**
- **Google is seeking to become a dominant AI company.**
 - http://puzzlefinancialadvice.com.au/150323_AFR_Google_aims_to_be_a_n_AI_company.pdf
 - <http://readwrite.com/2014/01/29/google-artificial-intelligence-robots-cognitive-computing-moneyball>
 - 'Technology Review points out that Google's research director Peter Norvig said the company employs “less than 50 percent but certainly more than 5 percent” of the world's leading experts on machine learning. That was before Google bought DeepMind Technologies.'
 - ““Think Manhattan project of AI,” one DeepMind investor told [technology publication Re/code this week](#). “If anyone builds something remotely resembling artificial general intelligence, this (Google AI team) will be the team.””
 - 'Google's core objective—which has never really changed despite branching out into other areas of computing—is to accumulate and make accessible all of the knowledge in the world.'
 - 'The next step for Google is to deliver that information to users with automated, intellectual context. The nascent Google Now personal assistant product that Google has been driving is the first step in this, but it has a lot of room to grow.'
 - 'What if you could use a device — like a smartphone, Google Glass or a smartwatch—to automatically identify all relevant information in your area and deliver it to you contextually before you even realize you want it?'
 - 'Google's driverless car could benefit from all of these technologies as well, including speech and pattern recognition.'
 - 'From a people perspective, Google's head of engineering, Ray Kurzweil, is the world's foremost expert on artificial intelligence. Andy Rubin joined Google in 2005 when the company purchased his Android platform to create a smartphone operating system. But currently, Rubin is taking his job of building Android much more literally as he now heads up Google's fledgling robotics department. Jeff Dean is part of a senior fellow within Google's research division

working in the company's "Knowledge" (search-focused) group, which will most likely be the team to incorporate DeepMind. Those names are just a few examples of Google's best brains at work. Google also has plenty of machine/computer brains that perform the bulk of the heavy lifting at the company.'

- <http://readwrite.com/2015/02/05/avoid-working-for-machines-be-more-human>
- "Apple co-founder Steve Wozniak on robot overlords and electric cars" 24/3/15
 - http://www.brw.com.au/p/tech-gadgets/apple_cars_founder_steve_wozniak_3qp2KuhwqGb70TZmyLtccK
 - 'Apple co-founder Steve Wozniak has said **he wants Apple to take on Tesla in the car business**'
 - 'He said he had long dismissed the ideas of writers like Raymond Kurzweil, who have warned that rapid increases in technology will mean *machine intelligence will outstrip human understanding or capability within the next 30 years. However Mr Wozniak said he had come to recognise that the predictions were coming true*, and that computing that perfectly mimicked or attained human consciousness would become a dangerous reality.'

How do we win from this rapid rate of technology change?

- Invest in companies that will benefit from the technological change
 - So far, our key vehicle is Platinum Asset Management Funds.
 - Technology has been a key theme for Platinum Asset Management in recent years. They have invested in companies like:
 - Technology providers like Intel, Samsung, Ericsson, Google, Baidu.
 - Internet Portals.
 - <https://www.platinum.com.au/Journal/Views/The-New-Internet-Age/>
 - Invest in companies that may be major beneficiaries of the rapid technology change. Eg selected large multinationals like Toyota.
 - Invest in countries that are likely to be major beneficiaries of the technological change.
 - Asia is likely to one of the biggest winners.
 - Japan as a major technology provide to the world (eg in electronics, components, robotics) should be a winner.

Appendix A.

Internet Portals & other technology:

- <https://www.platinum.com.au/Journal/Stocks/LinkedIn/> 17/7/14
- <https://www.platinum.com.au/Journal/Views/Virtual-Banks/> “Virtual banks are flourishing as the gap between customers and financial services players rapidly widens. This new league of competitors has become a disruptive force on the industry as legacy banks are left trapped in an outdated and costly model.” 24/7/14
- <https://www.platinum.com.au/Journal/Views/Smartphones/> “Smartphones accounted for 63% of all mobile phone shipments in first quarter 2014, up from 51% the year before. While these numbers are impressive, the reality is somewhat more complicated” 16/7/15
- <https://www.platinum.com.au/Journal/Stocks/Oracle/> “Founded by Larry Ellison in 1977, Oracle is the dominant provider of Relational Database Management Systems (RDBMS). In 1979, it launched the very first RDBMS for the commercial market for clients such as government agencies and US telecom operators. After growing to become one of the largest technology companies in the world with a vast product and solution portfolio across hardware and software, RDBMS still represents the lion’s share of Oracle’s business.” 23/1/15

Appendix B. Some technology stocks

Google share price

Google Inc. A Class (GOOGL US Equity) 577.54 12.59

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Oracle

Oracle Corp (ORCL US EQUITY) 43.71 -0.7

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