Chapter 2

The Augmented Age

I propose we should call the next age the **Age of Augmented Intelligence,** or just simply the **Augmented Age**, because of how radically embedded and personal technology will augment *your* **life** and *your* **behaviour**. This time the changes to our world are overtly personal. It's not just about industries being disrupted, or technology being invented, it's about how your life will change radically on a day-to-day basis compared to that of the preceding generations.

It's not just about AI either. It's about radical shifts in societal interactions, radical changes in the way the world is connected and works together. Simply classifying the next age as the **Second Machine Age** is too much of an economist's view of the world—machine- or AI-based automation leads to economic impact from a productivity or jobs' perspective. The change we will see this time around will be much, much more about how we live our lives and how society operates as a whole. The rate of change

in terms of cultural impact will be beyond anything we've seen in the last 250 years. That is what is different this time. This time it's about you.

Since the coming of the industrial or machine age, society has been continuously impacted by new technologies, be it the steam engine or the selfie stick. Today, we have a generation growing up that measures changes in months, not decades. We have billion-dollar companies created often in less time than it takes traditional companies to launch a new product line. The rapid nature of this change has much more to do with how we respond as individuals and collectively as a society, than focusing on the underlying technology behind that change.

As humans, we're conflicted about change. As a species, we're constantly trying to develop, push ourselves further, evolve, create wealth, explore, discover, improve our knowledge and make our lives richer, more abundant and better. However, when change affects our jobs, our homes or our families personally, it can get a bit funky, a bit dislocating. For instance, if we were to lose our jobs because a more efficient manufacturing process or advanced computer algorithm made us redundant as employees, then we would probably be quite upset about it. We might even protest for the outlawing or restriction of that specific technology or new business model, or even for governments to exclude our industry from tariffs or taxes so that our outdated business approach could remain competitive in a world that has practically rendered our traditional approach obsolete.

It's Happened Before, It Will Happen Again

Not wanting to borrow too much from the *Matrix* or *Battlestar Galactica*, the reality is that this cycle of new technological developments that spurs entirely new industries and wealth,

but at the same time dramatically changes employment patterns and challenge dominant industry players, has been happening constantly over the last 200 years. What we recognise to be different about the Augmented Age is that this rate of change is now accelerating because of underlying technologies and the subsequent reduction of innovation, production and adoption cycle times.

While commentators like Ray Kurzweil and Peter Diamandis might classify all of this change as the coming singularity or "Age of Abundance,"[1] a factory worker at Ford Motor Company in Detroit or at Foxconn in China might have very different views regarding the impact of this technology. A textile artisan in the early 1800s, a chimney sweep, a farm tiller in the US or UK in the 1920s, a video rental store clerk, a one-hour photo processing machine operator, a newspaper reporter and a taxi driver are all examples of jobs that have been significantly impacted by technological change.

Despite our very best efforts to adapt incumbent businesses to the rapidly changing world of the Internet, the dominant players that emerge out of these ages are mostly new players. It's why Apple and Spotify are the big players in music distribution today versus Sony, Virgin and Tower Records, all of which dominated the 1990s. It's why Amazon Kindle and Apple iBooks are the fastest-growing players in book distribution today, and why Borders, Dymocks and Angus & Robertson bookshops are no longer around. It's why we're unbundling and cord cutting from cable TV in favour of Netflix, Hulu and YouTube and why Blockbuster failed to adapt when its stores became an anachronism. It's why we're ordering increasingly from Amazon and Alibaba, instead of jumping in the car and heading down to our local shopping centre or retail outlet, or even comparing the Amazon price while we are physically inside a Best Buy store.

Within a few years, the new players who have built their businesses differently are simply better positioned to take advantage of the changing behaviour trends, and grow rapidly, while the incumbents are hunkered down trying to stop these new players from gaining further traction through regulation, antitrust moves, government roadblocks and so forth. Regardless of these defensive actions, in all cases within a few years, the disruption is complete—employment patterns have changed, the government has moved out of the way in favour of progress and the new players have either absorbed the old players or the old players have been marginalised and consolidated to serve a much smaller market facing ongoing decline.

While the Internet and smartphones are creating a very rapid shift in behaviours and business, despite technological advancements, some disruptions take longer. Two examples of this are what we see with renewable energy sources versus the oil and gas "cartels" and what occurred in the 1600s with regard to the Catholic Church and the emergence of the printing press. However, both of these examples are uncommon outliers and, generally speaking, the overall trend is for an acceleration of disruptive shifts.

The facts are that it never ends with old business models or obsolete technology surviving as the dominant approach. It rarely ends with incumbents retooling and cannibalising their businesses to reinvent themselves within a few years. Thus, these changes are always *disruptive*.

How Disruption Is Evident through the Ages

In day-to-day life, each age has resulted in significant changes to consumer behaviour, employment and services. What was

---

1   Diamandis, Peter H. and Steven Kotler. *Abundance: The Future Is Better than You Think.* New York: Free Press, 2012.

all the rage in 1920 is no longer a part of our daily routine. Today, particularly for Millennials or those who reached adulthood after 2000, smartphones are a fact of life. According to recent surveys, almost 90 per cent of Millennials said that their smartphones never leave their side,[2] and 80 per cent of them said that they sleep with their phones[3] (as in the last thing they do at night and the first thing they do in the morning is use their phones). This is markedly—and obviously—different behaviour from that of teens and young adults who lived at the start of the 20th century. These types of behavioural shifts quickly become normal while we are in the midst of that change, and over time they collectively add up to create significant changes in society.

Before we get to what comes next in the Age of Augmentation, let's look at the disruptions of the past 100 to 200 years and what impacts these have had on society. That way we can predict more accurately what will happen over the next 20 to 50 years.

Let's start with employment patterns and industries.

Table 2.1: Top jobs in the early 1900s vs for 2020

Top Jobs in early 1900s	Top Jobs for 2020
Farmers	Computer technology engineers
Farm labourers	Environmental scientists
Mine operators	Data mining analysts
Household services workers	Healthcare workers
Craftsmen, tradesmen	Entrepreneurs & small business owners
Factory production operators	Psychologists, counsellors & therapists
Managers, clerks and office workers	Business managers & administrators

The top jobs of 2020 will, of course, be very different from the top jobs 100 years ago. Over the last 200 years, we've moved from agrarian societies to very technology- and service-driven industries. In 1750, 80 per cent of the UK population lived in rural areas, by 1900 the figure had fallen to 30 per cent, and by 2030 it is expected to be just 8 per cent. The same phenomenon is happening in China, with figures rising from 13 per cent through to 40 per cent between 1950 and 2000, and projected to reach 60.3 per cent by 2030.[4]

Between 1750 and 1850, agriculture grew tremendously in the UK, US and Europe but, by 1900, employment in the farming sector was set for a gradual century-long decline. This is
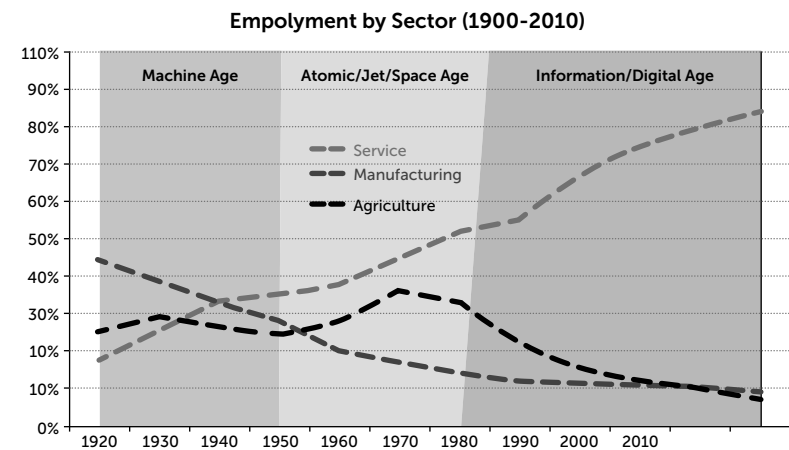

Figure 2.1: How the "Ages" changed employment patterns.

not to say that farming output declined. On the contrary, output improved greatly due to technologies like tractors, improved crop selection, better irrigation technologies and pesticides.

Table 2.2 highlights the technological leaps that each age brought, and the subsequent impact on the global stage from an economic, welfare and employment perspective.

2 Zogby Analytics Survey. Cited in Kiplinger, Lisa. "Millennials LOVE their smartphones: Deal with it." *USA Today*, 27 September 2014. http://www.usatoday.com/story/money/personalfinance/2014/09/27/millennials-love-smartphones-mobile-study/16192777/
3 Pew Research Center. "Millennials: Confident. Connected. Open to Change", 24 February 2010. (www.pewsocialtrends.org/2010/02/24/millennials-confident-connected-open-to-change/)

4 Brown, Felicity. "Percentage of Global Population living in cities, by continent." *Guardian*, 29 August 2009. (www.theguardian.com/news/datablog/2009/aug/18/percentage-population-living-cities)

The **machine age** disrupted manufacturing processes and developed "scale" as a concept in production, greatly improving productivity. In the **atomic/space age**, production improvements still came about but were harder to produce, although output continued to climb. If anything, the atomic and space age was about thinking big, and capitalising on the rapid technological growth and improvements that came about because of World

Table 2.2: The technological advances and subsequent impacts of each age

Age	Technology Developments	Pros	Cons
Machine Age	Steam engine Irrigation, plumbing (and toilets!!) Railroads Telegraph Factories Electricity Automobile/ combustion engine Telecommunications Radio	Improved healthcare Longer life expectancy Improved hygiene/living conditions/sanitation Creation of formal trading and stock markets Growth in mining Emergence of mass Manufacturing Growth in middle-class Creation of mass media industry/advertising	Decreased use of artisans/craftsmen Decline in agriculture jobs Decline in horse industry Secline in service industries The Great Depression
Atomic/Space Age	"Tronics" Nuclear power Solar PV cell Jet engine/ commercial aircraft Satellite communications Television	Home appliances/ labour-saving devices Boom in energy production Boom in mass manufacturing Nuclear medicine Commercial airlines Television industry	Nuclear weapons Globalisation resulting in exporting of jobs CO^2 production boom 70's oil crisis
Information/ Digital Age	Computers Networking Internet Mobile/smart phones Social media	Computer industry/tech sector boom(s) Creation of computer gaming industry Mobile industry Creation of e-commerce	Decline in manufacturing Decline in mining Strong dependence on Importing in developed world Japan's lost decades (90- 2010), Asian crisis Negative population growth in 20 countries Global financial crisis (2008) Increased youth unemployment

War II. In the **digital/information age**, there was an initial push towards process efficiency, such as the early mainframes (like ERMA[5]), and further automation in the factory and production space. In the 1990s, this extended to business processes and operations being automated at an enterprise level with enterprise-wide software solutions like SAP. However, the Internet went further and disrupted distribution mechanics such as we saw in the books and music industries.

The **Augmented Age** will bring about a huge rethink of processes involving dynamic decision-making, pattern recognition and advisory services as machine intelligence optimises those processes and feedback loops. Whereas the Internet was most commonly about disruption of distribution, availability of information and rethinking the value chain, the next age will be about disruption of information, intelligence and advice (the application of information and intelligence) itself. The Age of Augmentation will bring with it three major disruptions:

Artificial Intelligence that disrupts the nature of advice, that is better at everyday tasks like driving, health care and basic services than humans. While many fear the possibility that hyper-intelligent robots or minds will take over the world, for the next 30 years, it is far more likely that these AIs will be specialised and purpose built, and not necessarily human equivalent intelligence (more on this later).
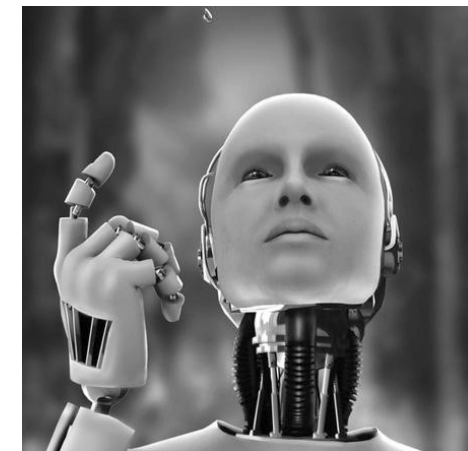

Figure 2.2

5 The Electronic Recording Machine, Accounting (ERMA) was developed from 1950 to 1955 by the Stanford Research Institute (SRI) to automate the bookkeeping associated with cheque processing at the Bank of America. In 1950, the bank's checking accounts, known as current accounts in the UK, were growing at the rate of 23,000 new accounts per month, and before introducing ERMA, its banks were forced to close their doors at 2 p.m. to cope with manual processing.

Distributed, embedded experiences that are embedded into the world and devices around us but enable frictionless, contextualised service, products, advice and value creation, which in turn are monetised based on their effectiveness. In a world that is constantly augmented by data and information, value, personalisation and context will be key.
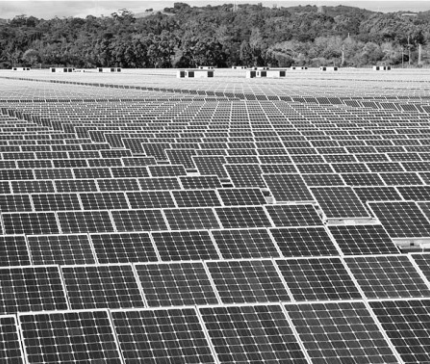
Figure 2.3

Infrastructure improvements that radically change the way energy is delivered, the way people and goods are delivered, the way modern economies compete and the way markets value commodities. Whether drones, solar energy, electric cars or self-driving cars and trucks, the way value moves around the world will have shifted.

Figure 2.4

The other technology developments that will have significant impact in the Augmented Age, but can't be classified as disruptors in the same way, include:

Metamaterials that are constructed using nanotechnology or new methods of engineering. Metamaterials emerging include:

- An invisibility cloak (or surface material) that diverts visible light or microwaves around an object coated in the material,
- Coatings that can conduct electricity or can turn any surface into a display,

- Clothing or textiles that will generate an electrical charge or include sensors and other circuits embedded in the weave,
- Carbon-nanofibre tethers which could be used to construct space lifts or similar,
- Super-strong and super-light metals and composites that can be grown like a tree or cultured in a vat,
- Windows that have transparent, embedded solar photovoltaics (PV) so that they can generate electricity.

3D printing that allows you to download almost any design for any product and print it in real time. 3D printing is also known as "additive manufacturing", because of the technique it uses, namely adding or extruding a layer of material such as ABS/PLA plastic 1 to 3 millimetres at a time to slowly create a three-dimensional object or design. In July 2015, the astronauts on the International Space Station downloaded a "wrench" and printed it using a specially designed 3D printer. Such a technology could substantially reduce size, weight and storage requirements for long-duration spaceflight. If you have to carry tools, for example, that may not be required under most circumstances, or you need to carry multiple sets of tools for redundancy, you could simply carry the required raw materials to prime a 3D printer. You could even, theoretically, print additional 3D printers.

The biggest potential issue with the coming Augmented Age is the shift in patterns of employment. Throughout the previous ages, there was a rebalancing of the workforce among industries. In the machine age, employment shifted largely from established industries to manufacturing. The manufacturing sector grew steadily through the 20th century until the 1970s to 1980s when process, electronics and automation took their toll on that sector too, and those jobs started to shift out of

factories and into service industries. What will happen in the 21st century when AI and experience design reduce employment in the service industries? Where will those jobs go?

Employment Impact

For over 100 years, employment has been moving from big industry to services. Whether in agriculture, fishing, mining or, in the last 50 years, manufacturing, as processes have become automated, we've shifted to jobs where humans matter. But in a world where the ability of a human is surpassed by artificial intelligence, there is a real risk that many humans will lose their jobs.

Futurists are deeply divided on this vision of the future. Some claim it will be a new gilded age, with humans working less and having more leisure time to pursue the arts and greater knowledge and learning like never before. Those with a negative view of the disruptive nature of AI argue that there will be a net loss of employment for the first time in 250 years as a result of technological advancement. There's only so many AI or robot ethicists and robot psychologists that we'll need in the Augmented Age.

A study released by Oxford Martin School's Programme on the Impacts of Future Technology entitled "The future of employment: how susceptible are jobs to computerisation?"[6] evaluated 702 jobs on a typical online career network, classifying them based on how likely they are to be computerised. The skills and level of education required for each job were taken into consideration too. These features were weighted according to how automatable they were, and according to the engineering obstacles currently preventing automation or computerisation. The results were calculated with a common statistical modelling method. The

outcome was clear. In the United States, more than 45 per cent of jobs could be automated within one to two decades. Here are a few jobs that are basically at 100 per cent risk of automation (I've highlighted a few of my favourites):[7]

Telemarketers	Data Entry Professionals	Procurement Clerks
Title Examiners, Abstractors and Searchers	Timing Device Assemblers and Adjusters	Shipping, Receiving and Traffic Clerks
Sewers, Hand	**Insurance Claims and Policy Processing Clerks**	Milling and Planing Machine Setters, Operators
Mathematical Technicians	Brokerage Clerks	Credit Analysts
Insurance Underwriters	Order Clerks	Parts Salespersons
Watch Repairers	**Loan Officers**	**Claims Adjusters, Examiners and Investigators**
Cargo and Freight Agents	Insurance Appraisers, Auto Damage	Driver/Sales Workers
Tax Preparers	Umpires, Referees and Other Sports Officials	Radio Operators
Photographic Process Workers and Processing Machine Operators	**Bank Tellers**	Legal Secretaries
New Accounts Clerks	Etchers and Engravers	**Bookkeeping, Accounting and Auditing Clerks**
Library Technicians	Packaging and Filling Machine Operators	Inspectors, Testers, Sorters, Samplers and Weighing Technicians

Figure 2.5: Jobs with 100 per cent risk of automation.

Others say that the problem is that AI will create huge wealth for the limited few who own it, thus implying that the wealth gap between the 1 per cent and the remaining 99 per cent will become even more acute. The ongoing viability of society as we know it will not be based just on distribution of technology and the elimination of poverty, but on a more equal distribution of

---

6   The research paper is available at www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf

7   These are jobs with 0.98/0.99 probability of disruption through technology. Based on a ±2 per cent confidence interval, this basically is a statistical certainty.

wealth so that the impact of AI is not a cause for further class division.

You might say that the above expectation is naïve. Probably, but it's either that or we are likely to see a clash between the "technocrati" and the users to such a degree that its effects would be felt for decades. However, it doesn't have to be like that. If technology is made freely or cheaply available, especially technology that houses, clothes, feeds and cares for individuals, then we indeed could find humanity in an age of abundance. In almost every example we've cited over the last 250 years of technology disruption, new technology has resulted in the loss of some jobs but also in the net creation of new jobs and industries that have outweighed the loss.

Pew Research Center conducted a very comprehensive review of these issues back in August 2014,[8] inviting futurists, journalists and economists from around the world to offer their views on the impact of AI and robotics on the future of jobs. In total, 52 per cent said that the world will be a better place with more jobs being created by technology than will be displaced and that we will do as we have done in each previous disruptive age. However, the other 48 per cent believe that the displacement of both blue-collar and white-collar workers will be on such a great scale that it will inevitably lead to vast increases in income inequality, mass unemployment or underemployment, and breakdowns in social order.

Regardless of where you stand in the argument of how AI and robotics will affect our future, one thing is absolutely certain. It will be a time of continuous disruption. The skills that students need to learn are going to change rapidly. Maybe what we need to teach students is not just science, technology, engineering and maths (so-called STEM) subjects, but agility,

creative thinking, rapid learning and adaptation too. One of the reasons the Luddites found the shift so difficult is that thinking about changing their employment was painful and difficult, so it was easier to resist the change.

What if we give our children the skills to adapt, to change faster than previous generations did? Maybe then the shift in jobs and employment patterns would not be as disruptive as it otherwise could be.

Where could jobs be created? Let's take a more in-depth look at solar energy. This is the generation capacity of photovoltaic cells from 2000 to 2018 (est.).

Once again when we look at the growth of solar PV technology over the last 20 years, we can clearly see that exponential growth curve feature that has come with so many technology developments of the last 100 years. This development is likely to be very disruptive in the near term. Let me explain how. Even though solar provided just 0.4 per cent of America's electricity in 2014, it's growing at an incredible rate. Rooftop solar generation has roughly tripled[9] since 2010 (some estimates are as high as a 418 per cent increase in the four years from
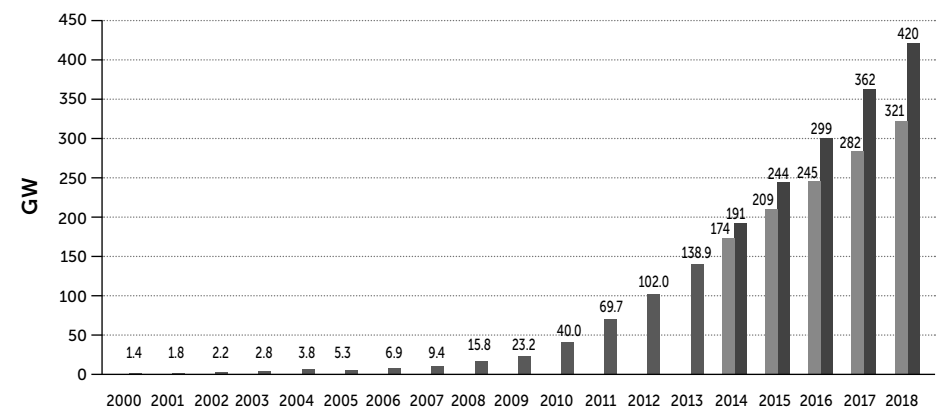

Figure 2.6: PV capacity growth EPIA forecast. (Source: EPIA)

---

8   Pew Research Center. "AI, Robotics, and the Future of Jobs", 6 August 2014

9   Source: http://cleantechnica.com/2014/04/24/us-energy-capacity-grew-an-astounding-418-from-2010-2014/

2010). Current estimates are that a new rooftop solar system is now installed every four minutes[10] in the US. The threat to the established grid is clear and significant, especially because solar installations are speeding up quickly. If rooftop solar reached just 10 per cent of the US market, it would result in utility company earnings falling by up to 41 per cent!

> The opinion of David Crane, chief executive officer of NRG Energy... as he starkly frames it, [solar] poses "a mortal threat to the existing utility system." He says that in about the time it has taken cell phones to supplant land lines in most U.S. homes, the grid will become increasingly irrelevant as customers move toward decentralized homegrown green energy.
>
> **"Why the U.S. Power Grid's Days Are Numbered",**
> **Bloomberg Businessweek, 22 August 2013**

The CSIRO, Australia's primary federal agency for scientific research, reported that by 2040 more than half of Australia's electricity would be generated, and stored, by prosumers[11] at the point of consumption.

Putting aside the whole climate change argument, when solar energy effectively becomes "free" or just significantly cheaper than electricity generation through coal or gas, it will *have to* rapidly disrupt grid-based systems. Why? Solar doesn't require a grid to be efficient because it can be installed in every home or at every point of consumption. So the costs incurred by utility companies in maintaining the grid become untenable. While solar is already close to parity at generation, we don't need a system of generators and the traditional network to distribute
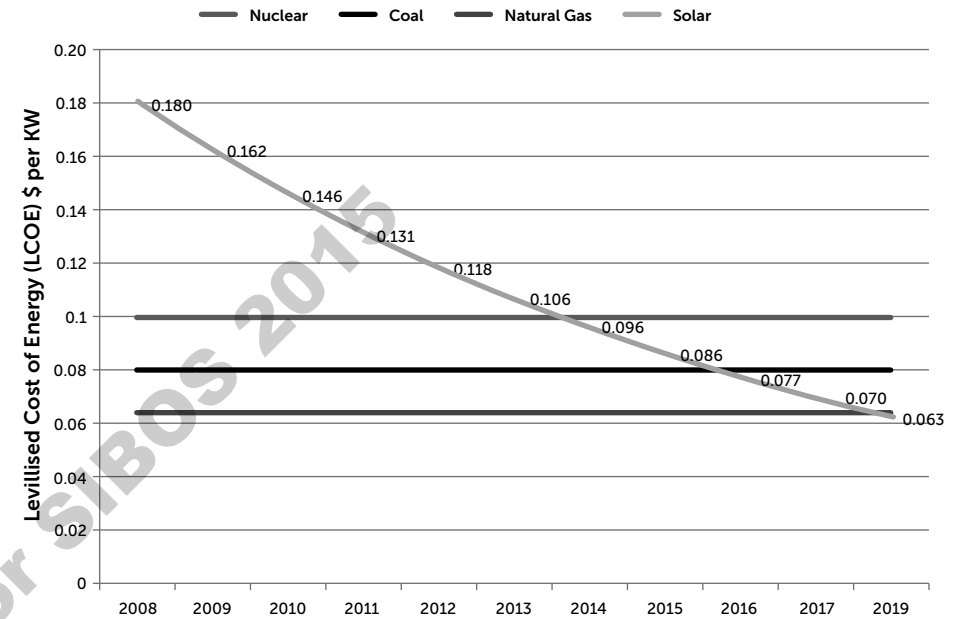
Figure 2.7: A steady decline in the cost of solar energy.

that energy. The concept of maintaining a grid based on wooden poles or high-tension power lines becomes counter-intuitive and no longer viable. Once again, David Crane made an insightful observation on the disruptive nature of this change in energy distribution systems.

> "Think how shockingly stupid it is to build a 21st-century electric system based on 120 million wooden poles ... You can strengthen the system all you want, but if you accept that we're in the first stage of adaptation, the system from the 1930s isn't going to work in the long term."
>
> **David Crane, 5th Annual ARPA-E Energy Summit, February 2014**

---

10 Source: http://www.americanprogress.org/issues/green/report/2014/05/29/90551/rooftop-solar-adoption-in-emerging-residential-markets/
11 A prosumer is both a producer and consumer.

Recently, Tesla Motors, an automotive and energy storage company, announced that its new US$5-billion Gigafactory in Nevada will not only produce batteries for Tesla vehicles but will also sell batteries—called Powerwalls—for homes. These batteries are designed to capture excess solar capacity throughout the day so that homes can continue to operate independent of the grid in the dark and in cloudy weather when solar capture is reduced.

Nine days after Telsa's announcement, the company had already received 85,000 orders, worth more than US$800 million,[12] for its new home battery, leading it to announce that

Figure 2.8: Will Tesla's Powerwall batteries create the "off-the-grid" movement?

the battery was sold out until mid-2016. Tesla's Gigafactory sounds like a pretty good investment right now.

The essential problem here is clear. With the adoption of solar energy and the deployment of the Tesla Powerwall or similar products, many homes will soon attempt to go off-grid. If enough homes do, existing utility companies will lose money and will certainly be unable to maintain or service the grid, leading more homes to rely on newer technologies.

The decade-long transition away from the fossil fuel-based generation has already started. A brief written for the National Bank of Abu Dhabi (NBAD) by the University of Cambridge and PricewaterhouseCoopers(PwC) stated that solar photovoltaic power is expected to reach grid parity in 80 per cent of countries within the next two years.[13] Surely much cheaper, cleaner solar energy for all is better than pulling coal out of the ground and converting it to run across wires laid over 120 million wooden poles? Science fiction author Ramez Naam has some great analysis on his blog showing that unsubsidised solar will be roughly half the price of natural gas and coal within a decade. Ultimately, on this basis alone, solar has to win.

Looking ahead, the good news is that there are 125 million homes in the US, and more than 2 billion globally. That's a lot of homes to retool with solar cells and batteries over the next 20 to 30 years. Today, 8 million people are employed in renewable energy, but estimates predict that as many as 37 million people globally will be employed in this industry by 2030.

The metamaterials industry could be worth US$650 million by 2025, so this too will contribute significantly to employment growth in developed nations. Manufacturing is likely to either become highly automated or shift to nations with cheaper labour which, in the context of the next decade, most likely means the

12 Walker, Alissa. "Tesla's Gigafactory isn't Big Enough to Make Its Preordered Batteries." *Gizmodo*, 8 May 2015

13 NBAD, University of Cambridge and PwC. "Financing the Future of Energy." *PV Magazine*, 2 March 2015

African continent rather than China and India. China and India will have to rely more on consumer demand for growth rather than outsourcing from developed nations.

Gigging, Job-hopping and Cloud-based Employment

It was recently reported by Mintel that almost a quarter of Millennials would like to start their own businesses, and nearly one in five planned to do so in the next 12 months.[14] In order to do so, in markets like the United States or Australia where the cost of college education is making it unattainable for most students, and a poor investment for many others, this age group is choosing instead to be educated by online platforms, hackathons, internships, start-ups and experimentation rather than through traditional college approaches. Because of this alternative route to education, this generation is tech-savvy and expects flexibility. A total of 66 per cent of Millennials would be willing to wear technology to help them do their jobs.[15] In fact, 40 to 45 per cent of Generation Y regularly use their personal smartphones and download apps specifically for work purposes (as opposed to 18 to 24 per cent of older generations).

In the UK, 85 per cent of Generation Y graduates think that freelance or independent working will become a more common and accepted way to succeed in the job market over the next five years.[16] In fact, freelancing is becoming so common amongst Millennials that they have even come up with their own term for it— **gigging**. As in "I've got a gig at Google." Increasingly, this type of work is done at home or at a Starbucks. It's hardly surprising then that almost half of Millennials surveyed in the UK and the US show a strong preference for this sort of working lifestyle.

The full-time job[17] is historically an anomaly. Prior to the industrial age, it didn't really exist. Early industrialists, who needed to have workers on a production line at the same time for efficiency, are most likely responsible for creating the concept of a structured work week. Consequently, for the last 100 years, the 40-hour-a-week job has been the centrepiece of work life simply because there was no better way for people to gather in one place at the same time to connect, collaborate and produce.

Now technology is changing the very nature of work. Millennials will be the first modern generation to work in multiple "micro-careers" at the same time, leaving the traditional full-time job or working week behind. "Work" is more likely to behave like a marketplace in the cloud than behind a desk at a traditional corporation. While a central skill set or career anchor will be entirely probable, most will be entrepreneurs, and many will have their side gigs. For instance, Uber, Lyft and Sidecar are platforms that give people a way to leverage their cars and time to make money. TaskRabbit is a market for odd jobs. Airbnb lets you rent out any extra rooms in your home. Etsy is a market for the handmade knick-knacks or 3D print designs that you make at home. DesignCrowd, 99designs and CrowdSPRING all offer freelance design resources that bid logos and other designs for your dollars.

Before long, technology will allow instant marketing of your skill set, the auctioning of gigs and expertise, and the ability to be paid for your work in near real time or as deliverables are finished.

> "Research suggests that today's college graduates will have a dozen or more jobs by the time they hit their 30s. In an uncertain job environment, it has become societally and culturally okay that they

---

14 "Enter the entrepreneurs." *Mintel*, 19 November 2014
15 Cornerstone OnDemand Survey, November 2014
16 "Generation Y and the Gigging Economy." Elance, January 2014
17 For more on work patterns throughout history, go to https://eh.net/encyclopedia/hours-of-work-in-u-s-history/

explore. The expectations have changed. Your 20s are used as the time where you actually figure out what you want to do, so the constant job hopping to explore multiple industries is expected."

Emily He, CMO of Saba[18]

Some of this is borne out of simple necessity. Millennials are generally more educated than their predecessors, but the impact of the 2008 financial crisis (the Great Recession) resulted in them being hit particularly hard on the job front, with 30 per cent of men and 37 per cent of women unemployed or not in the labour force.[19] This has driven a pragmatic approach to work, and technology and real-time engagement are underpinning the job-hopping and gigging that Millennials are becoming known for.

When Your Life Is Augmented

What we know from looking at the machine age, the atomic and space age and the more recent information or digital age is that each consecutive age, and corresponding technological leap, brings with it disruption, changes and upheaval. In all these instances, we've made progress as a species. Living conditions have improved, a billion people have been lifted out of poverty, life expectancy has increased, infant mortality has declined and, globally, the job creation trend has stabilised unemployment in most regions. Things are good in general, but that won't stop many from bemoaning how our young people are wasting their lives on social media or how greater technology integration in our lives is making us less human, less inclined to do the "normal" things that previous generations did.

What we do know is that humanity is constantly adapting

Figure 2.9: Has social media and the smartphone really stopped us from communicating?

when it comes to behaviour. Sometimes these changes appear minor, such as moving from reading a physical book to reading it on a tablet, when the real behaviour shift has actually been a dramatic shift in respect to how people buy books. On occasion, a new technology like email or the smartphone will dramatically change our daily routine, producing new behaviours that would have been unthinkable—even unimaginable—to our grandparents. Should we embrace such change or rally against it?

Recently, I was at an event speaking about behavioural shift, focusing particularly on how the younger generation—born into a world embedded with technology—simply finds such new technologies a natural part of their world. After my speech, I was pulled to one side by a concerned parent. This parent told me that he was scared by my description of the future world his 7-year-old son was growing up in and that he denied his son any access to computers or technology during the week, forcing him to play and experience life like a "normal child" and only use technology at the weekend.

---

18 *Business News Daily*
19 Pew Research 2014

The problem here is that this parent was imposing *his view* of what a normal childhood is on his child, a child born into a new generation, a generation that requires new skills to survive. If his child can communicate and compete with his peers on the basis of technology, then he could conceivably suffer negative consequences. However, there are good arguments for him encouraging physical activity so that his son doesn't develop bad habits in terms of a sedentary lifestyle.

Balance is required, but avoiding technological change isn't a strategy that will work for generations that need to move forward in a world imbued by tech. In most of the developed world, it is likely that you would not be able to get a professional job today without a LinkedIn profile or an online network you can leverage. Marshall McLuhan is credited with a great quote that aptly describes the world that the generation born post-PC and post-Internet find themselves in today:

> "I don't know who discovered water, but I'm pretty sure it wasn't a fish…"
> **Marshall McLuhan, 1966 speech**

Let's think about this generation born into a world of technology. A generation that has such a different worldview of technology that Jordan Greenhall[20] calls them the "Omega" generation—the last generation. Applying the Marshall McLuhan attribution, these kids who were born after 2000 don't see technology around them as new; to them, it is just like air or water. It isn't unique, it isn't disruptive and it isn't different—it's just there.

Children born after 2000 most likely don't attach much personal significance to events like 9/11, simply because to them

it is history. They certainly don't remember a time when there was no Internet. Most of them don't even understand the concept that TV shows used to be broadcast on a specific channel at a specific time of day, and the only way you got to watch it again was on a rerun.

Figure 2.10: Different language, different perceptions.

This generation is highly adaptable, but their lives and decisions hinge on the technology around them. For instance, how do they learn something? They Google it or watch a video on YouTube. They didn't grow up with VHS tapes, cassette recorders, vinyl records and cathode ray TVs. So even their language and lexicons are different. How do they decide which new phone, clothes, video game or music they should buy? They ask their networks as they are influenced by mentions and likes. To their parents, this may seem like strange behaviour. However, it is evidence of a huge generational shift in the way decisions are made and how connections are formed.

You might think that all of this technology makes our children less emotionally connected. In fact, research may agree to some degree. Recent research shows that there has been a great uptick in autism in the last two decades or so. Many believe that this is just better diagnosis, but even after you factor in better diagnosis

---

20 For more on Jordan Greenhall, go to http://reinventors.net/content/jordan-greenhall/

(26 per cent), greater awareness (16 per cent) and an increase in age of parents (11 per cent), it still leaves us with the statistic that 47 per cent of the net new autism cases are an unexplainable phenomenon.[21]

Some believe that being born into a world of technology is changing the way this particular generation reads emotional cues from faces, the way they emote and communicate. It is hypothesised that the causes of autism, Asperger's and other such conditions might be evolutionary adaptations to a world where it is more important for a child to have tech skills than people skills. We don't understand enough about these emerging trends to be sure on that front, but the statistics are significant outliers that can't be explained based on current medical science.

It's not that these children are necessarily less emotionally clued in. In fact, it seems that they get so much input on their friends' emotional states through things like social networking and technology that their emotional quotient (EQ) may be higher than that of previous generations. It's just that they're getting those cues through feedback loops in the ecosystem rather than through typically reading facial cues or through language.

This generation often communicates in real time about almost everything; including their relationship status, what they're eating for breakfast, which content they're watching and what products they're buying and which of those they like and don't like. They are using information sources I never had as a child or young adult to make decisions in much shorter time frames. In fact, it has been said that a young graduate in Lagos, Mumbai or Bangkok today has access to more information on his smartphone than the President of the United States had just 20 years ago. In other words, they are highly adaptable, highly

agile in their thinking and even less likely to resist technology change when it appears. In their world, change is a constant, and the fact that it is speeding up signals positive progress.

This may produce the biggest social disruption of all. The baby boomers (born 1946–1963) in particular, but also the early Gen Xs, those who are still at the helm of government and big business, tend to be the generations that are most resistant to political or economic change today because they consider stability to be a core need. In fact, the 111th Congress in the United States is the oldest congress in history, with the average member being 62 years of age.[22]

With the introduction of social media, we've seen a huge increase in protests by Gen Y/Millennials attempting to provoke change—whether through the Arab Spring, the Occupy Movements, protests against police brutality and extrajudicial killings in the US and the like. The baby boomers longed for sustained peace; Gen X for economic prosperity and stability. The new citizens of the world, the generation that will dominate the world by 2023, don't want stability per se. They want positive progress through change.

These two worlds will very likely collide in the next decade when it comes to issues like climate change, energy, employment and education. Especially when it becomes very clear that there is little or no representation in government for the largest generation of voters, or where interests of incumbent industries and lobby groups resist technology change, especially in countries like the US.

Advice in health care, financial services and technical areas, along with principles of government, have been predicated for the last 100 years on the concept of **information asymmetry—** the fact that the government or "advisor" knows something

---

21 Statistics taken from http://blog.autismspeaks.org/2010/10/22/got-questions-answers-to-your-
   questions-from-the-autism-speaks%E2%80%99-science-staff-2/

22 See www.slate.com/articles/news_and_politics/explainer/2013/01/average_age_of_members_of_u_s_
   congress_are_our_senators_and_representatives.html

you don't know. Increasingly that information asymmetry simply doesn't exist, and so it is getting harder and harder for governments to claim that they are acting in the best interests of the public when the influence of lobby or special interest groups is blatantly obvious.

One thing is certain. The disruptions that technology and the Augmented Age bring will be perhaps the most impactful on society's operation that we've seen since the start of the Industrial Revolution in the 1750s. The Age of Augmentation will be all about technology infused into every aspect of our lives, whether AI, amazing distributed experiences or entirely new value systems built up of new infrastructure and new value chains.

In 30 years' time, technology will be so small, so powerful and so integrated into our lives that it will be hard to define technology in the way we do today as devices, interfaces, multitouch, mouse and keyboards. We'll have technology that lives inside us, on our person, in our clothes, in our homes, in our cars and elsewhere, that in each instance is millions of times more powerful than the most powerful computers we have today.

Imagine a sensor network made up of nodes the size of a blood cell inside your bloodstream reporting on your health and vitals to your personal AI? Imagine an AI that listens to your phone calls and meetings so that it knows what to put on your calendar, and a smart home and a smart car that coordinate with that AI to organise your meals, transport and other integrated experiences.

> "It took $10 billion to sequence the first human genome, today we can do the same for 1 millionth of that cost. It took 5 years to sequence the AIDS virus ... today that would take less than a day, but in 10 years' time the computers that do these tasks will be a million times more powerful than they are today."
>
> **Ray Kurzweil, Exponential Finance Keynote, New York City, June 2015**

The possibilities are mind-blowing.

If you think of the Augmented Age, AI and technology as a threat to humanity, then perhaps the biggest problem you might have is that your choice to participate in this new world may be taken from you by a generation that is extremely comfortable with tech. For them it's not new—it's just the way they live their lives. It's cool, it's new and if it's not embodied by the latest device you need to have, or the latest app your friends are all using, it's just old and obsolete. The Augmented Age celebrates constant change wrought by technology, and those who resist that change will have the most to lose.