

SURVIVING THE SINGULARITY

AN MYOB FUTURE OF BUSINESS REPORT

September 2015



In 1984 James Cameron's movie Terminator introduced a new kind of super-villain to popular culture. The fictional Skynet was a computer network, which on achieving a level of artificial intelligence, recognises the human race as a threat to its existence and begins a campaign to exterminate humanity.

The film, one of many examples in movies and literature that play on our fears of out-of-control technology, neatly encapsulated one of the concepts scientists, authors and futurists have been discussing since the late 1950s.

With the rapid development of technology, many predict a point when computers reach a level of artificial general intelligence that enables them to learn on their own. This new intelligent entity would be capable of designing ever more sophisticated technology in a kind of runaway super-intelligence. The concept of a technological singularity describes this moment, when humanity is suddenly tipped from its place as the dominant intelligence on the planet and faces an uncertain future.

Whether that future is a technological utopia or global destruction, many leading theorists are now predicting the singularity may be reached within the next thirty years – with some claiming it may be in the next decade.

While it is by no means certain that the singularity will ever occur, it is clear that the rapid pace of progress in technological development is changing the way we live and work. Over the next thirty years, advances in technology will make many of the jobs we do, the businesses we run and the ways we interact obsolete.



In January, MYOB released The Future of Business report. In it, MYOB Chief Technology Officer Simon Raik-Allen looked ahead 25 years at what business might look like, and discussed ways in which SMEs can prepare. Now, one of Australasia's largest software developers looks at the rapidly evolving field of Artificial Intelligence, and how it may affect business, society and work in the future.



As businesspeople, entrepreneurs and students, how do we prepare now to make ourselves both relevant and successful in the future? How do we prepare to survive the singularity?

THE IMPACT OF THE SINGULARITY

BY SIMON RAIK-ALLEN



Simon Raik-Allen is MYOB's Chief Technology Officer. His role involves looking at the current and future trends in technology and how they can be developed to benefit SMEs. According to Simon, technology will continue to radically transform business.

As machines get smarter, there will be a time when someone creates a machine that can learn. We are not there yet, but a lot of progress is being made.

Scientists are beginning to understand more and more about the detailed operation of the amazing human brain; an extraordinary machine developed and refined over millions of years to thrive in our environment. As they do, engineers are replicating that understanding in software and silicon.

Alongside the capacity for emotion and free thought, one of the most mysterious and astonishing attributes of the human brain is its capability for learning.

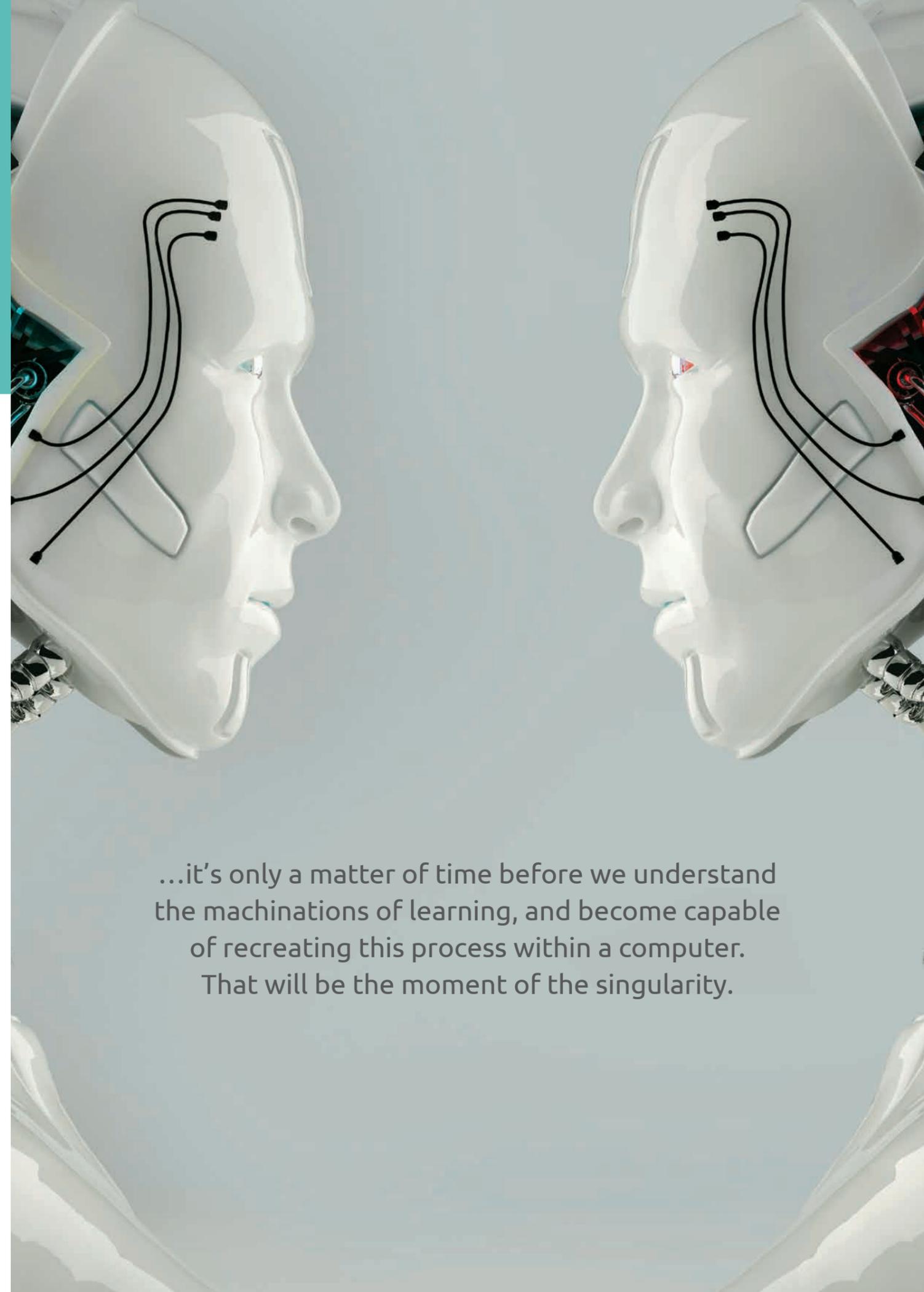
While we don't understand how learning takes place, our technology is constrained by our own inputs. Even though they are capable of incredibly complex calculations and processes, our current computers can only do what we tell them. While we are programming increasingly autonomous machines, they are still unable to decide to do things outside the parameters we provide. And though they

could have access to all of human knowledge, computers are constrained by their ability to interpret and apply the information they are given. To reason, respond and evolve.

However, it's only a matter of time before we understand the machinations of learning, and become capable of recreating this process within a computer. That will be the moment of the singularity.

Rapidly, that ability will give rise to an immense capability for autonomous reasoning by computers. Their intelligence and ability will soon surpass that of humans, and at that point, we will no longer be the dominant species on planet Earth.

The singularity is coming quickly, with predictions it will occur within the next 30 years. After which, the future of humanity is uncertain.



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WHAT THE EXPERTS ARE SAYING

Enhanced technological intelligence is already providing enormous benefits, and in the future could offer much more. Concepts that, just a few years ago were in the realms of science fiction, such as digital personal assistants and self-driving cars have already become reality. In the near future, massive technological advances in everything from advanced robotics to implanted biological enhancements have the potential to greatly improve our lives.

However, the fear that technology could turn on us, especially in the area of military development, is becoming increasingly widespread. In 2014, the United Nations Human Rights Council held its first debate on the issue of lethal autonomous robots. This is a rapidly developing field of the defence industry giving 'killer robots', from drones to missile batteries to guard robots, power to determine and engage their own targets, including people.

Even seemingly innocuous technologies like self-driving cars have recently come under scrutiny as their developers ponder how to govern the choices they might make when faced with an unavoidable accident. For example, what does a self-driving car do when faced with swerving into oncoming traffic, risking the lives of its passengers, to avoid a child who has run into the road?

But for many of the world's leading theorists, the rise of artificial intelligence poses a far greater threat.

Internationally renowned physicist, Professor Stephen Hawking recently told the BBC: "The primitive forms of artificial intelligence we already have, have proved very useful. But I think the development of full artificial intelligence could spell the end of the human race. It would take off on its own and re-design itself at an ever-increasing rate. Humans, who are limited by slow biological evolution, couldn't compete, and would be superseded."

Apple co-founder Steve Wozniak is sceptical that current technology is capable on delivering on all the promises it makes, especially for the much-hyped internet of things. However, he agrees the singularity is the most significant development in the future of technology. He spoke publicly on the issue recently in Sydney, saying that: "The most important thing for the future, which all of the leaders of our time with brains like Stephen Hawking and Elon Musk and Bill Gates are talking about as the biggest threat to humanity, is that once machines have intelligence and can think themselves, that's a turning point."

But perhaps the expert who is most vocal on the risks associated with the rise of artificial intelligence is tech billionaire Elon Musk. The Space X and Tesla pioneer, who has invested in a company called Deepmind, which is working in the field, caused a stir recently when a comment he made to the author of a discussion on AI was published online, revealing his strong fears about the rapid development of AI.

Mr Musk has previously likened the advent of artificial intelligence to 'summoning the demon'.

At the end of July 2015, Professor Hawking, Steve Wozniak and Elon Musk co-signed an open letter alongside a thousand AI and robotics researchers, including MYOB's Simon Raik-Allen – presented at the Joint International Conference on Artificial Intelligence in Buenos Aires, calling for a ban on offensive autonomous weapons.

Not everyone is as concerned about the risks of artificial intelligence, however. Ray Kurzweil, who is widely recognised for popularising the idea of the singularity, has been appointed by Google to work on the next stage of the search engine's development: intelligently organising and processing the world's information. Mr Kurzweil, co-founder of the Singularity University, predicts that computers will outstrip their creators in intelligence by 2029.



"The risk of something seriously dangerous happening is in the five year timeframe. 10 years at most. Please note that I am normally super pro technology and have never raised this issue until recent months. This is not a case of crying wolf about something I don't understand".

ELON MUSK

MAXIMISING THE HUMAN FACTOR



In a world where so much is digitized and automated, it's the human factor that people will value the most.

The ability to offer the crucial things technology can't – such as person-to-person interactions, displays of emotion, and shared, interpersonal experiences – will see the creation of new industries.

As technology begins to break down and homogenise our experiences, the very culture and character that has made us uniquely successful over thousands of years will once again become a thing of value.

Today, commerce is moving away from human interaction. More and more businesses are starting or moving online, allowing consumers and businesses to interact without the need for direct human engagement. Retail businesses, in particular, are struggling and many are closing, due to the convenience of online shopping.

The work environment is also moving away from physical interaction. Working from home is becoming more commonplace and remote workforces are becoming more widespread. People are able to spend their days without living interaction – just digital ones. The use of holograms will accelerate this even further.

But, in a world where growing levels of consumption are bad for the environment – and therefore expensive and limited – when it does come time to make a business interaction, you will want to make the most of it and use it as an opportunity for human interaction.

TECHNOLOGY AT THE LIMIT

While there is growing recognition of the risks of the singularity, we still want to harness the power of advanced technology. This will mean taking computers to the limit – without crossing the line. As with other human inventions that have both powerful potential and significant inherent risks, such as nuclear technology, that limit will have to be clearly defined and closely guarded through international agreements and development controls.

Over 70 years ago, science fiction author Isaac Asimov introduced the concept of the 'Three Laws of Robotics'; primary directives designed to ensure robots would protect and obey humans. We are now so close to developing the technology that might create the singularity that serious effort needs to be given to understanding how it might be controlled. To prevent unforeseen consequences of well-meaning development, or more nefarious actions by states or individuals, it is time to act now to begin to assert those controls – before the robots break their programming.

However, assuming we take computer intelligence to the edge of the singularity, we will still be living in a highly automated and advanced computerised world. We'll potentially be sharing it with smart machines that have a form of limited or governed artificial intelligence.

So where does that leave us? In a world at the singularity safety limit, what roles will we play, as people in business, and what opportunities can we find, and niches can we develop, in an increasingly automated world?

SHOPPING IN THE FUTURE

One of the best examples of the new realities of business is likely to be seen in the retail sector. In the internet age, retail has been the 'canary in the coalmine', showing some of the most obvious and significant changes as much of the world's consumption moves online.

Since the earliest days of commerce, humans have traded and 'shopped'. And the trading post or store in its many forms has been as much the centre of community life as the church or the tavern.

The major shortcoming with online shopping is the instant gratification that comes with in-store shopping and the ease with which consumers can get their hands-on products in real time. As new technologies emerge, that advantage for traditional retailing will continue to shift.

At the same time, particularly as people recognise the risks of consumption on our broader environment, we are seeing growing demand for products that are locally made, using traditional methods and traceable inputs that can be tracked from the farm gate or original producer to the consumer. This is not only an environmental movement – it also reflects a desire for a return to the unique outputs of human creativity.

As the impact of technology increases, retail will evolve to where stores don't sell goods – they sell experiences. Bricks and mortar retail spaces will become showrooms, which emphasise the unique attributes of the product or the values of the brand. Instead of loading up a cart with goods to purchase in store, consumers will try on or sample the products on display, scan and purchase the items they desire using their mobile phone, and have them delivered to their homes within 24 hours – possibly by drone.

In the future, the retail experience will focus on interacting with someone who knows you, understands what you like and can offer new ideas and suggestions based on your digital profile and the latest trends from around the world. No longer just a retail assistant, these highly-trained service people will be tour guide, advisor, curator and subject matter expert, helping you make choices that suit your tastes and experience the latest novelties in a constantly changing world. Having that human interaction will become a cherished experience – you may even pay to enter the store for this interaction, regardless of your purchase.

Human inputs in products will also become increasingly valued. In a world where mass automated production is ubiquitous, items that are handcrafted, locally sourced, and individually made will become rare, fashionable and sought-after.



HUMAN INTERACTION

The other key element of business, negotiation, and deal making, which is currently moving away from face-to-face, will also become more focused on personal interaction.

In the future, special business deal houses will emerge, where people will book time to meet other companies and make deals. They will house technology and holograms, and set up environments conducive to making deals between humans much more effectively.

Although these may not be in the flesh, they will focus on creating a real experience, rather than relying on algorithms negotiating on your behalf. Indeed, computers may have become so fast at negotiating deals, and so adept at exploring all the angles and making complex assessments of their opponents – like highly advanced versions of today's poker playing algorithms – that humans may need to step in to broker the final deal based on trust, shared values, and an old-fashioned handshake.

BAD ROBOT

A CINEMATIC HISTORY OF RUN-AWAY TECH

1927
METROPOLIS

In Fritz Lang's sci-fi epic, exploited workers in a dystopian 2026 are inspired to launch destructive uprising by a robot.



1975
THE STEPFORD WIVES

Based on Ira Levin's 1972 novel, the Connecticut suburb of Stepford might seem idyllic, but the town's murderous female robot doubles are hell bent on holding back the feminist cause.



1983
WAR GAMES

Before enjoying his more famous 'day off', Matthew Broderick nearly starts World War 3 playing a computer game against an AI. "Shall we play a game?"



1997
AUSTIN POWERS, INTERNATIONAL MAN OF MYSTERY

Austin has his hands full fighting off a horde of killer fem-bots. "Oh be-have!"



2015
EX MACHINA

Administering the Turing test on an attractive robot invented by the founder of the world's largest search engine (sound familiar?), a young programmer gets caught up in a murderous battle of wills.



1968
2001: A SPACE ODYSSEY

In Stanley Kubrick's classic, the ship's computer HAL 9000 murders crew members of the Discovery One to prevent them disconnecting it. "Open the pod bay doors, Hal!"



1982
BLADE RUNNER

Just who is the replicant, the Tyrell Corporation Nexus-6 synthetic humanoids, Harrison Ford is really pursuing in this Ridley Scott adaptation of Philip K Dick's Do Robots Dream of Electric Sheep?

1982
TRON

A computer hacker is abducted into the digital world and forced to participate in gladiatorial games where his only chance of escape is with the help of a heroic security program. "On the other side of the screen, it all looks so easy."



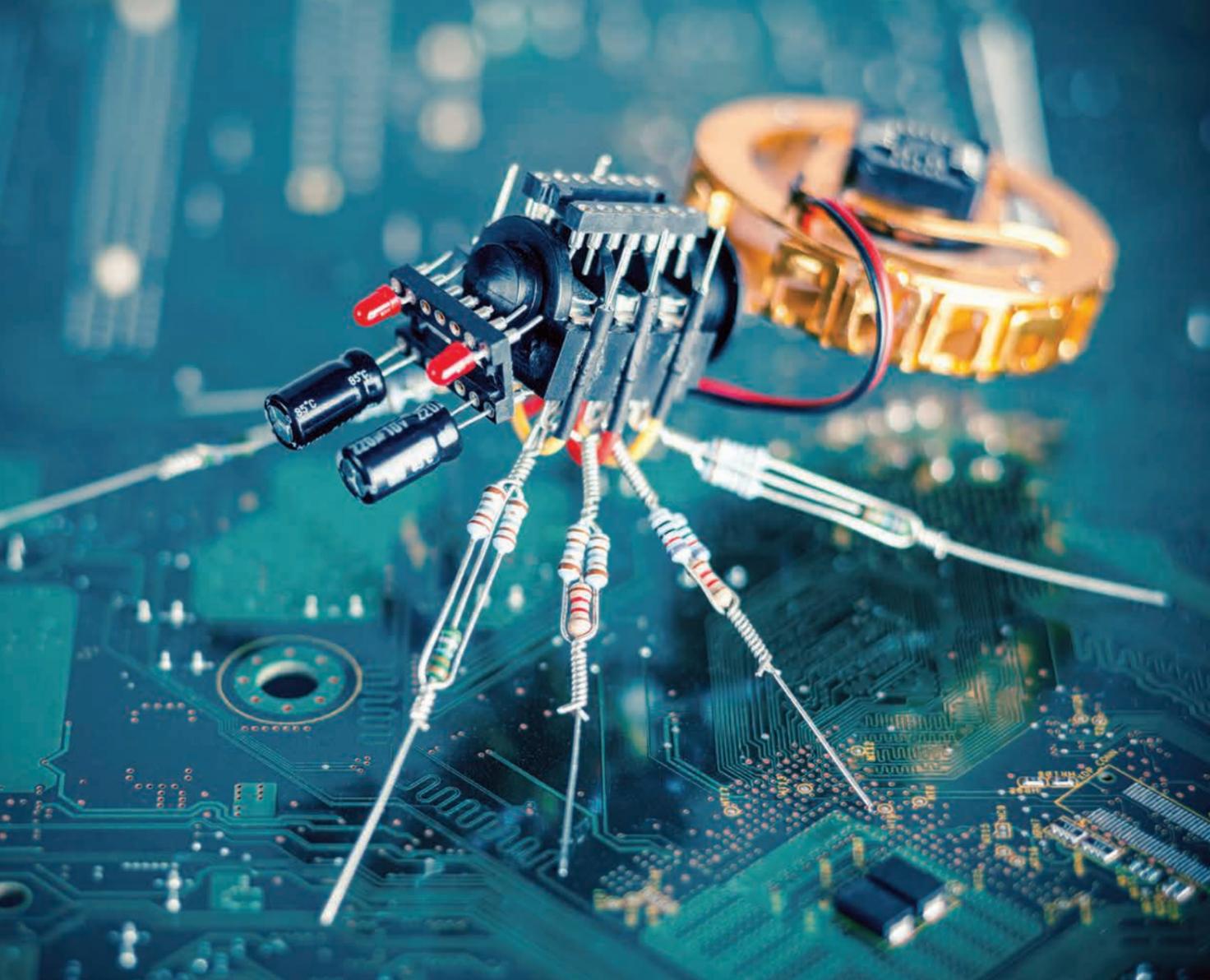
1984
THE TERMINATOR

Arnold Schwarzenegger's killer robot has become a cult classic, but the Skynet that unleashed him on the world is frighteningly realistic. "I'll be back" - maybe soon!



2004
I, ROBOT

United States Robotics supercomputer Viki (Virtual Interactive Kinetic Intelligence) interprets Isaac Asimov's first law of robotics as meaning she must kill humans to save them from themselves. Whoops, hadn't thought of that!



HOW AI WILL AFFECT THE FUTURE OF JOBS

One of the fears often expressed about widespread automation and increasing technological automation is the threat of what has become known as the 'jobless future', where people just can't compete with the efficiency and versatility of machines.

In a speech recently, Microsoft founder Bill Gates predicted that within just 20 years, many current jobs will be replaced by software automation. While many manufacturing and processing roles – especially in dangerous or highly specialised environments – are already filled by robotic workers, other areas will soon be affected.

For example, within one of the largest local sectors, the professional service industry, a number of specialities are likely to disappear or see significant job losses, including telemarketers, auditors, bank tellers, travel agents, retail salespersons, technical writers, real estate agents, and word processors.



FACING EXTINCTION – OTHER JOBS THAT COULD GO BY 2034:

- Social media experts
- Print journalists
- Assembly line workers
- Postmen and women
- Data analysts
- Middle managers

The rise of automated technology and limited AI will also have profoundly positive impacts on many areas of work – opening up new job opportunities in areas that are currently only theoretical. It's been predicted that 65 per cent of children today will end up in jobs that are yet to be created.

So, today's young people face the challenge of preparing for careers that may not even exist yet and their current ambitions might not be relevant in the future.

A BRAVE NEW WORLD OF WORK

The Canadian Scholarship Trust Plan (CST) worked with foresight strategists to create job descriptions that will likely be available in the year 2030. With technology moving at such a pace, a glimpse into the future provides some insight on our future careers.

The roles they identified, range from designers recreating retro spaces: '*nostalgists*', and upcyclers that engineer recycled materials: '*garbage designers*', to specialists helping patients work through the health system: '*healthcare navigators*', and consultants to help families integrate with the robot world: '*robot counsellors*'.

OTHER NEW JOBS PREDICTED BY EXPERTS INCLUDE:

→ Bot lobbyist

A bot lobbyist will be able to take charge of a virtual army of real (and not-so-real) social media accounts to support a client's PR and marketing campaigns.

→ Future currency speculator

The growing virtual currency market will need experts, which could give rise to the future currency speculator.

→ Productivity counsellors

As workers compete in a future of scarcer work opportunities, and ever more information is available to employers about their staff's habits, health and attention, these specialists will be able to help provide maximum value.

→ Big data doctor

Big data already has a growing influence in many industries. A new area of medical specialisation could include doctors who provide treatment recommendations based on a patient's biographic profile and personal data.

→ Crowdfunding specialist

As crowdfunding websites like Kickstarter become increasingly popular, it is likely we'll see a whole industry grow up around managing, promoting and 'curating' the ideas pitched by fundraisers.

→ Jobs of the future counsellor

And to help a new generation come to grips with the changing future of work, it is likely the school jobs counsellor will have to have a firm view of the opportunities of the future.

THE FUTURE OF WORK

While we may not risk being enslaved by our robot overlords, the next wave of technology will have a profound effect on the number and types of jobs available.

According to research from Oxford University, nearly half of the US workforce is in danger of losing jobs to robots in the next 20 years. In particular, recent studies have found that as technology drives robots to be more efficient and cost-effective, people who work in lower skilled roles, including drivers and call centre workers, would be out of a job.

In an increasingly globalised economy, workers will also have to develop new skill sets, such as speaking multiple languages and changing sleeping patterns for multiple time zones. Humans will have to compete harder for a smaller number of jobs, while we battle our own biological limitations to keep up. As work begins to change the demands on our brains and bodies, we will increasingly use technology to augment and boost our abilities.

The demands of our new jobs in the technological age, and the advances we make in nano-technology and biological implants, will likely drive us to increasingly shape ourselves to succeed in this new world. The irony is that the singularity may not occur in machine intelligence at all.

The artificially intelligent beings that achieve global dominance might be us – a post-human combination of thousands of years of evolution and the latest technological revolution.

THE SHAPE OF THINGS TO COME...



KILLER ROBOTS

According to a recent study, almost one in five AI experts believe such technology will ultimately pose a threat to humanity. Super-smart machines already prescribe personalised treatments for cancer patients, write sports reports or beat human players in video games. But, despite the positive potential of AI – to help eradicate poverty, disease or the drudgery of daily work – there is fear of a future with self-aware machines.



INTERNET OF THINGS

The Internet of Things (IoT) is being developed around increased machine-to-machine communication. As chips and sensors become embedded in everyday objects, they will become able to share information, provide alerts and reminders and interact with our digital devices. Your fridge will be able to remind you to pick up milk when you are in the supermarket; your phone will be able to tell your car to warm the seats as you are five minutes from finishing your meeting. While there has been a lot of hype about IoT, it is already technically feasible and many companies are working to make it a reality.



SELF-DRIVING CARS

Some of the world's leading car manufacturers are currently in advanced testing of this technology, and a number are already incorporating autonomy features into their latest models. There are two different types of self-driving cars: semi-autonomous and fully autonomous. A fully autonomous vehicle that can drive from point A to point B without needing any interaction from the driver will debut in 2019.



DRONES

Drones (unmanned aerial vehicles) are becoming more and more a part of our lives. In the future, not only will drones buzzing around in the sky be as commonplace as cars on the street, but we will have our own personal drones. As well as carrying out services – such as making deliveries – it's been predicted by NASA that every home will have a drone in five or 10 years time. Currently, the military, the police and emergency services, real estate agents, farmers, scientists, and professional photographers commonly use drones.



GOOGLE'S DeepMind

British start-up artificial intelligence company, DeepMind, was bought by Google for \$400 million in 2014. One of the company's projects is the creation of a computer that will be so intelligent it will be capable of programming itself. Director of engineering at Google, Ray Kurzweil and his team are developing super-fast quantum computer chips based on the human brain. This will make machines more 'human', as the chips would enhance their intuitive decision making skills and predictive ability. Google recently started partnerships with two AI research teams of the Oxford University to help machines better understand their users by improving visual recognition systems and natural language



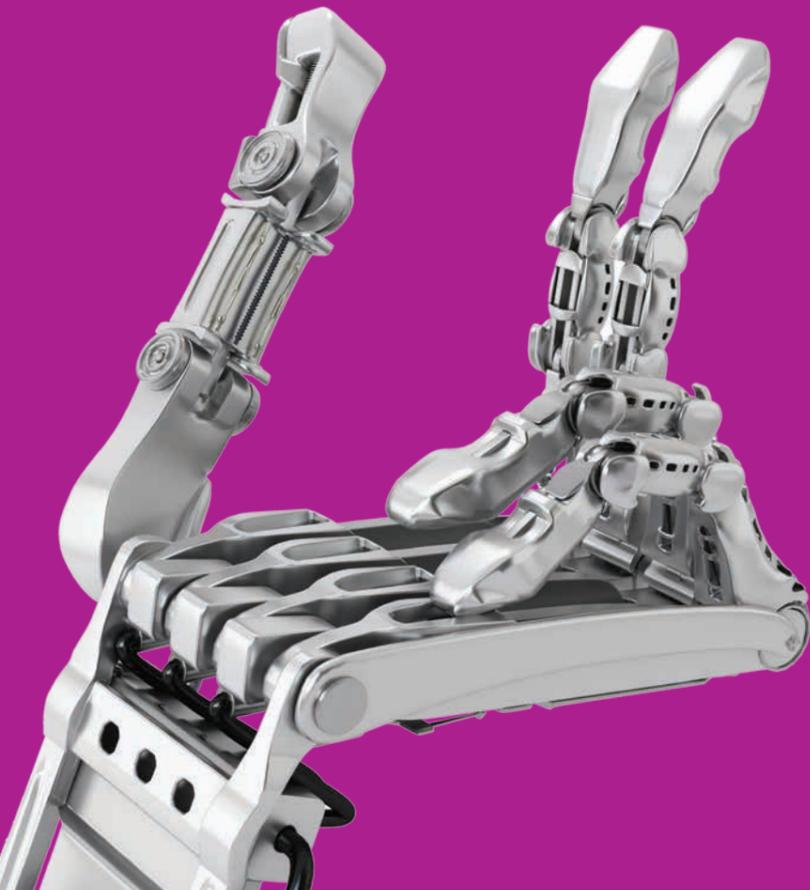
WATSON

In 2011, the IBM Artificial Intelligence software called Watson, beat humans in the general knowledge TV quiz *Jeopardy!* Watson has been developed to understand and use human language, using advanced language processing and automated reasoning and machine learning techniques. The competition was a proof of concept for a machine that has many real-world applications. After its short-lived TV career, IBM has continually developed Watson for a range of industries to provide analytical insights, support clinical decision-making and improve customer service. Watson currently resides in a cluster of 90 IBM Power 750 servers.

...THE FUTURE NOW

PREPARING FOR THE SINGULARITY

A GUIDE FOR SMALL BUSINESS



DIGITISE YOUR BUSINESS

Get online with a business website, and automate as many manual processes as you can. This is probably the most important step you can take in streamlining your operation today, to take advantage of the opportunities every new stage of technology provides. Anything you commit to paper now, or a system you have that can't handle automation, will not benefit your business in the future. Not only is the process good for your business now, it will prepare you for when the AI algorithms can operate over it!

1

SERVICE IS KEY

Focus on the customer experience that your product or service delivers, and be sure you understand why your customers like to interact with your business. Ironically in the age of robotics, human contact will become more valuable and sought-after, and your customers are likely to seek out a more human service experience.

2

BROADEN YOUR BUSINESS NETWORK

Again, as more and more elements of our existence become automated, dealing with human colleagues will become a unique element of business. To make your business stand out in an automated world, you will need to focus and leverage your interactions with other companies. Create relationships and partnerships now that will enable you to pool your resources as the new post-AI world evolves.

3

HOLLYWOOD ALWAYS DEPICTS AI IN A CITY-SETTING, SO WHAT'S GOING TO HAPPEN IN THE REGIONS?

Some elements of a more automated world, such as 3D printing factories, will need plenty of open space, so centres outside cities will boom. Of course humans need company and local communities will become more important. In an ideal world, with AI controlling and automating many functions, people will have more leisure time to enjoy, with a accompanying tourism boom likely around the world.

Also, holograms will enable us all to interact with each other wherever we are physically located around the globe – so people will no longer need to live in a city in order to work anywhere in the world.

WHAT IS THE ROLE OF ACCOUNTING SOFTWARE IN A WORLD DOMINATED BY AI?

In a world transformed by AI, online accounting and business management solutions will become even more critical. But it may not be money you are accounting for. It could be 'human experiences' that will become the currency of the future. You could barter, trade and trade IOUs for artwork, theatrical performances, gardening demonstrations and so forth.

As our world changes, technology will evolve with us. But unlike death, we will probably never beat taxes, so your small business will still have some form of financial reporting, hopefully compiled with just a few seconds thought and an imprint of your thumb or scan of your retina!

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