



Insight

The Technological Singularity



John Colvin
Principal



Samantha Mikhael
Research Assistant

The term 'Singularity' originally comes from theoretical physics, which states a point where a gravitational field becomes infinite¹. In a mathematical context, it is defined as the point in which a function becomes infinite¹. However, a specific type of singularity that has received robust attention is the 'Technological Singularity'. Singularity in this case refers to advances in technology, especially in artificial intelligence, resulting in machines that are smarter than our very selves and beyond our imagination².

Ray Kurzweil, the director of engineering at Google, is one of the main advocates for technological singularity³. The well-known futurist states that it is when the pace of technology increases so rapidly and its effect is so profound, that it changes the world and human life will be conclusively transformed⁴. Such transformations are predicted to alter the meaning of concepts we rely on, from business models to the human lifecycle, including death⁴.

Technological Singularity: The Feedback Loop

Here's a graphical representation of the technological singularity hypothesis:

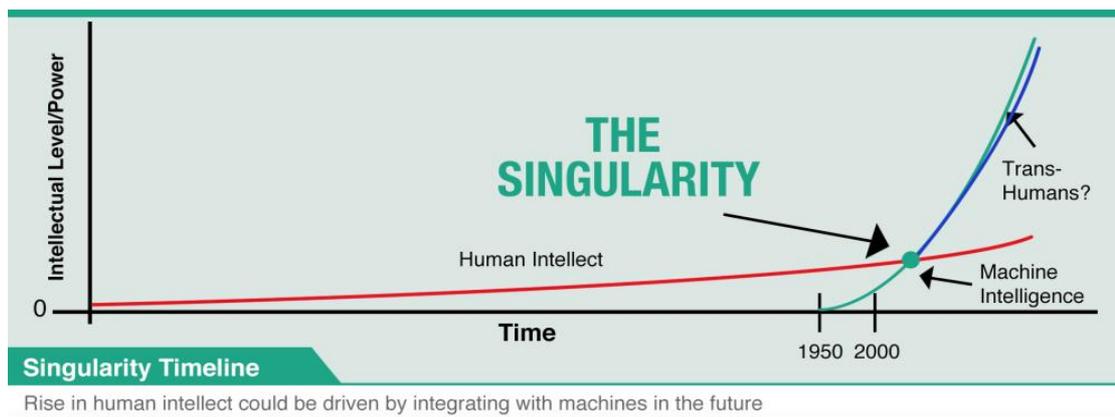


Figure 1. The Technological Singularity (innovationtorevolution, 2014)³

The figure above stipulates the point in time when singularity will occur. That is, the creation of artificial superintelligence, in which technology will surpass human capability⁴. Leading to the theory of transhumanism—that science and technology will evolve civilisation beyond its current physical and mental capacities³.

The feedback loop below depicts the application of singularity:

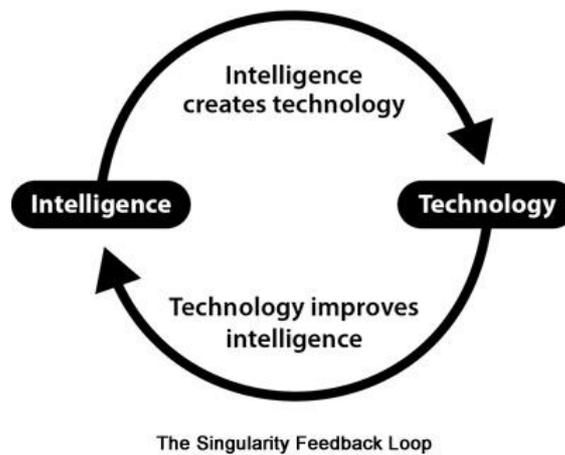


Figure 2. The Feedback Loop (Explainingthefuture.com, 2016)⁵

As shown, increased intelligence will create greater powered technology which will generate further intelligence and form a continuous positive loop. Although this may seem like just an idea, this is already evident in the world of computing, specifically the sophisticated microprocessor⁵:

- It has more than two billion transistors on their silicon wafers
- The positioning and wiring of the components is a task beyond our capability and can be achieved by computers
- If a microprocessor can design a more sophisticated chip, this will in turn result in the feedback loop and machines going on to improve itself at exponential rates

A predicted timeline of the visions of Technological Singularity

The popular futurist, Ray Kurzweil, who has an 86% accuracy prediction rate, expects singularity to occur by 2045 ². Furthermore, a specific predicted timeline of technological breakdowns and countdown to singularity, was put forth by the most intelligent people⁶. Here are a few predictions:

- 2020: Flying cars in a dozen cities⁶
 - 2022: Robots are capable of lip reading and face recognition and are common in middle-income households⁶
 - 2026: Autonomous cars dominate the roads⁶
 - 2028: 100% of new electricity generation is represented by solar and wind⁶
 - 2030: Specific predictions made by Ray Kurzweil
 - Artificial intelligence passes the Turing test, where computers will have human-level intelligence⁶
 - Humans will be cyborgs: our thinking will be a fusion of biological and non-biological thinking⁷
 - We will be neurologically connected to computers. That is, our neocortex in the brain where thinking occurs, will be connected to the cloud – expanding our minds and human qualities². This is predicted to be achieved by DNA nanobots, which allow aspects such as⁷:
 1. a back-up of our thoughts and memories
 2. emails to be sent directly to the brain
 3. access to Wikipedia by thinking about it
-

- 2032:
 - Medical nanorobots can extend the immune system⁶
 - Avatar robot will allow humans to teleport their consciousness to remote locations⁶
- 2034: Robots act as nurses, maids/butlers and assist elderly independence at home⁶
- 2045: Singularity – our intelligence will be multiplied by a billion-fold¹

Singularity: Leading the future of technological education and executive development

“Creating abundance is not about creating a life of luxury for everybody on this planet; it’s about creating a life of possibility.”—Peter Diamandis, Co-founder, Singularity University⁸

In 2009, Peter Diamandis and Ray Kurzweil founded the Singularity University which offers a range of programs, including The Exponential Technologies Executive Program⁸. This program aims to: “educate, inform and prepare executives to recognise the opportunities and disruptive influences of exponentially growing technologies and understand how these fields affect their future, business and industry (Singularity University, 2018).”

The goal of the program is for business leaders and governments to think exponentially, empower utilisation of exponential technology to address today's challenges and design frameworks for an abundant future to create opportunities and positively shape tomorrow's future⁸.

This therefore depicts the impact that singularity is having on technological education and its importance in the business world.

Let's debate: to fear or not to fear?

The fear that humans will create a machine that has its own agenda, which may threaten our existence has been a topic of debate¹. Artificial intelligence workers however, have proposed measures to counter-act such an occurrence. For example, putting a chip that is a fail-safe device in the brains of robots, which enables humans to automatically turn the system off through verbal command¹.

Despite these proposed measures, Kurzweil doesn't think humanity should fear singularity as the idea of technology dominating humanity is fiction². Rather, he states it is an opportunity for improving humankind. However, science researchers do warn against connecting our minds to the cloud, as how the mind works is barely understood⁷. Furthermore, neuroscientists have claimed artificial intelligence will not match human intelligence⁹. This is because, machine learning can only mimic the brain, but it misses the deeper elements that enables humans to learn⁹.

Others debate that singularity will be an acceleration of human progress rather than the ideology of a future technological breakthrough⁹. Additionally, the majority of artificial intelligence specialists, state that fundamental technological limitations may occur which may hinder singularity and even if it were to occur there should be no fear, as machines do not have a conscious, desires or goals¹⁰.

Advances in artificial intelligence and relevance to boards

There are evident advancements due to leveraging this technological trend and introducing new opportunities:

1. The medical industry is already utilising intelligent systems to enable greater accuracy in diagnoses. For example, physicians who incorporated machine-learning algorithms in their diagnoses of metastatic breast cancer, resulted in reduced error rates by 85%¹¹. The current transformations of AI in health care, foreshadows the future of how corporate directors can utilise AI and potentially the impact of technological singularity

2. Apple, Siri: who is responsive to voice commands and carries out a range of tasks¹¹
3. Chat bots in the financial sector: For example, Erica in the Bank of America as a virtual assistant¹²

According to a PWC analysis, by 2030, AI may contribute up to \$15.7 trillion to the global economy. Of this, \$6.6 trillion is likely to be from increased productivity¹². This will be driven by:

- Productivity gain from automating processes and augmenting labour force with AI technologies¹³
- Increased demand due to higher quality AI-enhanced products and services¹³

As evident, advancements in artificial intelligence are already influencing the world we live in. However, artificial superintelligence will have such a profound effect if it were to occur. Yet despite this, businesses are slow to welcome AI into the boardroom and adopt new technology into their core business¹². The growth of technology calls for a more iterative approach to business which will open unforeseen opportunities¹².

The relevance to boards:

- The cost of bad decisions is high, 50% of the Fortune 500 companies are forecasted to fall of the list, as failure rates are high for aspects such as digital transformations¹¹
- Businesses are becoming too complex for boards to make productive decisions without the use of intelligent systems¹¹
- Only 16% of board directors understood how technological advancement could alter their business and industry¹¹

Possible solutions:

- Companies will need a strategy for the potential future technological transformations¹¹
- Realignment of organisations is necessary in today's thriving world, that is moving towards technological singularity¹²
- Embrace change by allowing AI into the board room to fulfil customers requirements more precisely and free up the skilled workforce to deliver higher level human functions, which Kurzweil stated would be a differentiator in helping businesses in a competitive market¹²

Overall conclusions

Singularity will not occur on its own. Every progression is fuelled by human effort through years of intellect and resources⁵. However, technological disruption is already influencing our daily lives, businesses and industries. Such emerging technologies can help identify strategies which provide value in the marketplace¹¹. Boards that have the capabilities, tools and exponential mindset, will dominant in knowing how to apply technology and overcome its disruption to solve the world's greatest challenges and create an abundant future⁸.

Sources

1. 26 February 2011: <https://bigthink.com/dr-kakus-universe/the-technological-singularity-and-merging-with-machines>
2. 5th October 2017: <https://futurism.com/kurzweil-claims-that-the-singularity-will-happen-by-2045>
3. 29th October 2014: <https://innovationtorevolution.wordpress.com/2014/10/29/technological-singularity-from-fiction-to-reality/>
4. 25th July 2013: <https://bigthink.com/100-biggest-ideas/the-singularity-of-ray-kurzweil>
5. 30th January 2016: <https://www.explainingthefuture.com/singularity.html>
6. 11th September 2018: <https://futurism.com/singularity-countdown-future-affiliate>
7. 6 June 2015: <https://www.businessinsider.com.au/ray-kurzweil-thinks-well-all-be-cyborgs-by-2030-2015-6?r=US&IR=T>
8. Singularity University: <https://su.org/about/>
9. 22nd March 2016: <https://www.newscientist.com/article/mg22930661-800-vision-of-singularity-questions-ai-intellect/>
10. 20th September 2017: <https://www.wired.co.uk/article/elon-musk-artificial-intelligence-scaremongering>
11. 19th October 2017: <https://sloanreview.mit.edu/article/ai-in-the-boardroom-the-next-realm-of-corporate-governance/>
12. 17th April 2018: <https://www.forbes.com/sites/forbestechcouncil/2018/04/17/reaping-the-riches-of-the-coming-singularity/#7c87eb311e94>



13. 2017 PwC: <https://www.pwc.com/gx/en/issues/analytics/assets/pwc-ai-analysis-sizing-the-prize-report.pdf>

Thanks for reading

colvinconsulting.com.au

jcolvin@johncolvin.com.au

