

THE  
FUTURE



# ARTIFICIAL HORIZON

Will our AI technological future be filled with dazzling hope, or apocalyptic doom?

By Chris Waldburger



## IN THE PAST FEW MONTHS, ELON MUSK, BILL GATES AND STEPHEN HAWKING HAVE ALL ISSUED WARNINGS TO THE SCIENTIFIC COMMUNITY REGARDING THE POTENTIAL THREAT OF DEVELOPING ARTIFICIAL INTELLIGENCE (AI). THE WARNING STEMS FROM A BELIEF IN THE LAW OF ACCELERATING RETURNS: THAT TECHNOLOGICAL DEVELOPMENTS WILL INCREASE EXPONENTIALLY AS THEY FEED OFF EACH OTHER.

In the case of AI, the artificial narrow intelligence in existence today (think smartphones, chess-playing computers and so forth) could, according to the likes of Musk et al., quickly develop into artificial general intelligence (a human-like intelligence not yet in existence—think of the computer HAL in *2001: A Space Odyssey*).

This is where the problem arises. If an artificial general intelligence (AGI) is created, such an intelligence could easily deploy itself in service of creating an artificial super-intelligence (ASI) which, unencumbered by biology, and operating with an intelligence far beyond human capabilities, could decide to refuse to be switched off and then embark on a perfectly rational mission to kill humanity in pursuit of a programmed goal such as ending spam email—or filling the world with paper clips.

And so Musk is warning of “our biggest existential threat as a species”, while Hawking says “the development of full artificial intelligence could spell the end of the human race”. Musk is also putting his money where his mouth is by donating around R118 million to Vicarious and DeepMind Technologies (owned by Google), two firms committed to developing AI in an ethical and responsible fashion.

Director of engineering at Google, Ray Kurzweil, is a firm believer in the close emergence of ASI, yet he is largely sanguine about this eventuality. He suggests that we are reaching a new epoch in history, which he calls the “singularity”, in which humans and machines will merge, immortality will be achieved, and a new non-biological cosmos will begin as humans upload themselves

onto new hyper-intelligent machines.

For Kurzweil, this eventuality is a mere matter of time.

However one perceives AI and ASI—as a burgeoning golden age or as a potential extinction event—the future spelt out by our modern-day prophets is nothing short of astonishing. Could it possibly be true that humans could create minds vastly more intelligent than our own? Could a mind be non-biological?

It is indisputable that at this present moment we have machines that can outperform humans in a multitude of tasks. In fact, that has been true from at least since the Industrial Revolution. We currently have computers that can outperform us in playing chess, answering general-knowledge questions and translating languages, among other things. These abilities have, by and large, provided seemingly endless opportunities for innovation in business and service delivery to consumers.

Indeed, it is incredible how quickly modern society has unequivocally embraced artificial intelligence. The vast majority of people are entirely comfortable with onboard computers on aeroplanes, motor vehicles and mobile phones—computers that all undoubtedly employ AI.

Yet, another advance in this long tradition of rapid development is currently under way in South Africa, where Metropolitan Health has deployed IBM's Watson in its customer service division. Watson is a supercomputer capable of answering questions in natural language. It rose to fame in 2011 when it competed in the American quiz show *Jeopardy!*, beating out two former winners of the show to win the \$1-million prize. Watson works by sorting through large amounts of data in order to produce answers to questions in a human fashion.

Metropolitan's ‘adoption’ of Watson vividly demonstrates the great potential of AI in dynamically opening up new avenues of service and product development.

Watson has already been deployed commercially in healthcare when, in 2013, IBM partnered with the Memorial Sloan Kettering Cancer Center in the United States to help doctors treat cancer patients. The computer was able to search vast volumes of published cancer literature and case histories in order to make informed suggestions about possible treatments.

Metropolitan Health, meanwhile, provides medical scheme administration, health risk management and wellness solutions on a fully outsourced basis to medical schemes and employer groups, and currently provides services to more than three million individuals across various medical schemes and employer groups in South Africa.

Chief executive Dylan Garnett states that Metropolitan has decided to partner with Watson in order to further the company's ability to personalise customer service. “We believe that the right technology applied in the right environment with the right intent is an extremely powerful tool in enabling us to meet the needs of our clients.

“A vast quantity of valuable healthcare data is only available in medical journals, pharmaceutical guidance notes, doctor notes and patient records. This data is in natural language, and not encoded for use by traditional computers. By understanding natural language, Watson can ingest

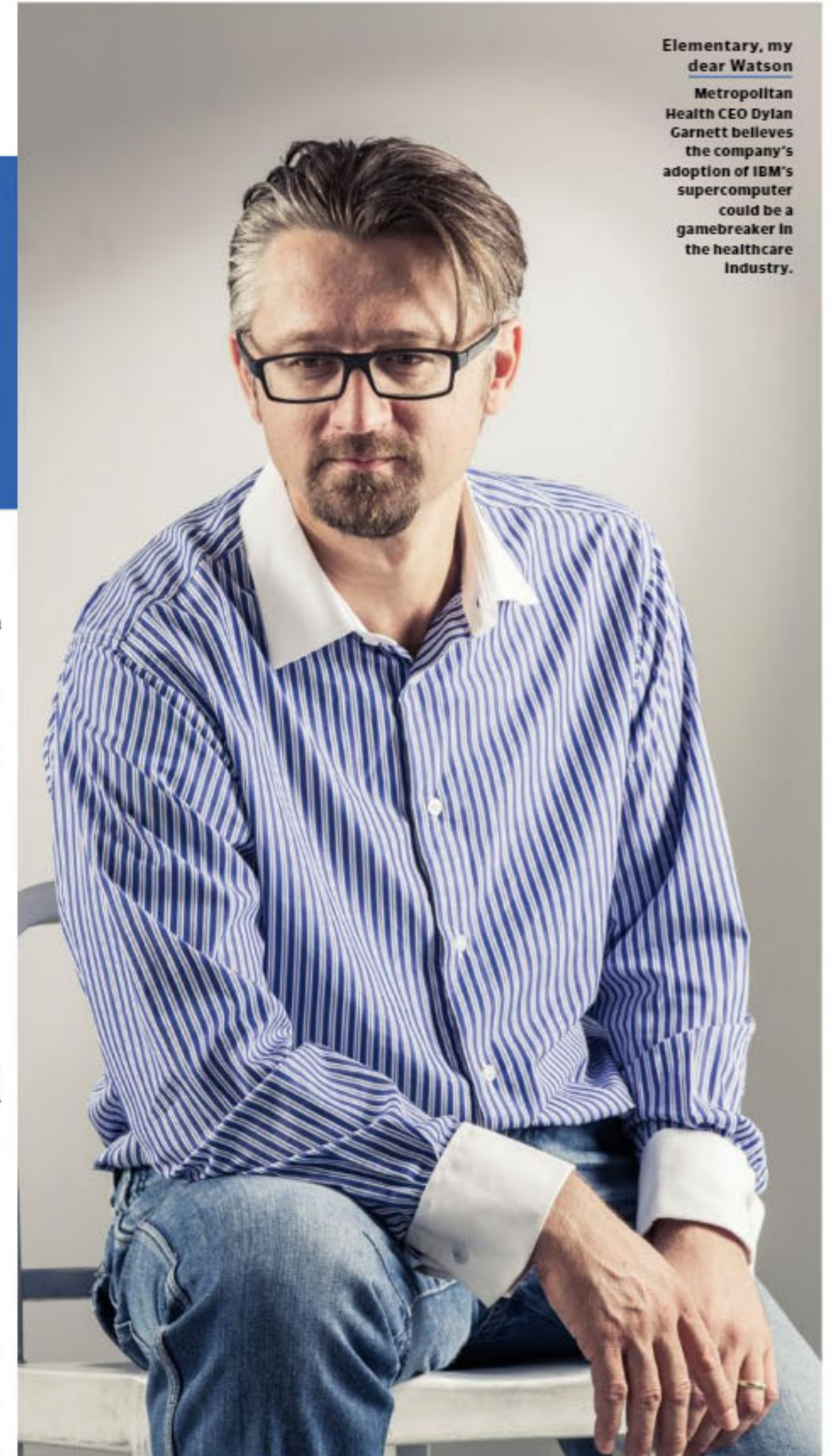
this data without time-consuming and expensive preparation. Once ingested, this data joins the Watson ‘corpus’ of information that is available for use.”

Metropolitan aims to utilise Watson in such a way as to allow the company's agents in its contact centres to consult Watson as a ‘virtual coach’ in order to answer questions more effectively and in a more personalised manner.

Because Metropolitan currently handles more than 12 million client interactions each year, Garnett believes Watson can be a gamebreaker in the healthcare industry. “Watson will also significantly enhance the consistency of responses and management of queries. As Watson learns, it will also pre-empt future enquiries and prompt agents to proactively share information. The customer experience is positively impacted, as responses will be consistent across interaction channels, gradually transforming the experience from transactional to intuitive. Interaction time will be reduced, and more customers can be serviced as the information recall becomes much faster.”

As for the future, he believes the ability to record and interpret vast amounts of big data could revolutionise South African healthcare.

Garnett asks us to imagine a future in which every citizen has a personalised wellness adviser powered by Watson, in order to mobilise the most up-to-date global knowledge of what works and what doesn't in sustaining healthy lifestyles; every doctor interacts with each patient with complete recall and knowledge of everything that has



### Elementary, my dear Watson

Metropolitan Health CEO Dylan Garnett believes the company's adoption of IBM's supercomputer could be a gamebreaker in the healthcare industry.



gone before (because Watson never forgets); and in which rural community health workers have access to a Watson-powered 'doctor in their pocket' to help them serve their community more effectively.

The picture he paints is undoubtedly positive. An artificial intelligence that can provide a kind of machinery to process information could be used for tremendous good in fields in which knowledge empowers so impressively. In this regard, it is completely understandable why researchers are moving full steam ahead to unlock all the benefits of this next step in computing.

So why, then, the doom and gloom offered

## AN ARTIFICIAL INTELLIGENCE THAT CAN PROVIDE A KIND OF MACHINERY TO PROCESS INFORMATION COULD BE USED FOR TREMENDOUS GOOD IN FIELDS IN WHICH KNOWLEDGE EMPOWERS SO IMPRESSIVELY.

by the likes of Musk, Gates and Hawking?

The issue is the belief that the leap from informational machine to a kind of consciousness wherein real decision making and conceptualisation abilities are conferred on a non-biological machine is both possible and imminent. (In Watson's case, it is clear the computer merely sifts data—it has no real independent thinking ability of its own.) If this is the case, a situation is created in which the Law of Accelerating Returns is married with the Law of Unintended Consequences on the grandest possible scale.

But there are many dissenters from the viewpoint of prophets of doom such as Musk, as well as the optimistic futurists such as Kurzweil.

Many maintain that the possibility of achieving ASI is simply non-existent. For some thinkers, this scepticism is predicated on their view of the complexity of the brain, and the so-called 'anti-progress' of neuroscience as it discovers more and more how little is known concerning the relationships between synapses and neurons and subjective thought.

Early computer theorists such as Alan Turing posited that the brain is nothing but a highly complex machine, the software of which simply awaits a more advanced science

in order to penetrate its mysteries. Yet, current research suggests that if Turing was right, then the brain is a machine, a piece of matter, unlike any other. So much so, that modelling it non-biologically may be impossible.

However, University of Cape Town computer researcher Dr Geoff Nitschke believes a reworking of current computer architecture, from silicon circuit boards and electric transistors, to an explicitly brain-mimicking neuromorphic architecture, may theoretically allow computers eventually to become deep-learning, artificial brains. "This means that the computer will be made up of artificial neurons and neural tissue engineered from replicated organic materials that make up biological central nervous systems. In such a neuromorphic computer, the electrical impulses firing on organic connections between the artificial neurons would be the software, and the physical network of neurons would be the hardware," he explains. "Replicating a biological brain perfectly with a neuromorphic computer could conceivably give rise to the intangible 'something more' of our minds, or self-awareness that we associate with consciousness."

Nitschke is quick to point out that this would by no means be a foregone conclusion, even if the right biotechnology were developed. "However, if the computer remains a disembodied entity, like a brain in a jar, then consciousness seems unlikely, since thousands of years of evolution of brains together with our bodies seem to have played a key role in developing the capacity to problem-solve, reason, speak, experience a lifetime of events, and perhaps to even be self-aware."

He pours water on the idea that ASI is therefore inevitable. "The idea that ASI machines are an inevitable result of current technological progress in AI research is a fallacy. Examples of advances in AI are frequently cited in the media, but these typically do not address the ultimate goals of AI: to produce machines with intelligence comparable to our own and potentially far beyond."

Another problem in the narrative of an ASI on-the-horizon is the contention that surrounds what consciousness actually is.

Nitschke notes that the broad disagreement surrounding the essence of consciousness makes it very difficult to envisage how it could be created. Indeed, philosophers of a classical bent continue to insist that a human-like artificial intelligence is categorically impossible because consciousness is, in fact, immaterial.

The most famous of this set is the New York University professor Thomas Nagel, who recently endured some blistering critique for suggesting in his 2012 book, *Mind and Cosmos*, that consciousness cannot be understood by normal Darwinian evolutionary categories.

To use an example, the process of seeing is easily understood scientifically (from photons to neurons) right up to the point where a subject sees. But who is conducting the seeing? Where is the sight taking place? Neuroscientists are beginning to suggest there is no foreseeable, materialistic answer to such a question.

Some scientists have begun to assert that the brain is not synonymous with the mind, but rather a kind of transmitter for some kind of deeply enigmatic non-material substance—something analogical to an electromagnetic wave. If this is the case, ASI may be nothing to fear at all—simply because it is impossible on a fundamental level.

Yet, even if ASI is not on the horizon, that does not alter the clear and present power and dynamism of the AI currently on hand or soon to be within reach. For example, Nitschke, like Garnett, asserts the incredible power AI has to make the enormous amounts of raw data available in our information age usable and valuable.

This is a power not to be taken lightly. As per Garnett's vision, this power can be harnessed for the common good, but it could equally be utilised for darker motives: health information, or deep surveillance. In this sense, figures like Musk and Kurzweil may both be right in an unintended fashion. Our technological future may be filled with dazzling hope or apocalyptic doom—or, more likely, a combination of both.

In short, the threats and opportunities offered by the power of AI may be parallel to the threats and opportunities we have always faced in the form of our own human, non-artificial intelligence. ●