Artificial intelligence

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Why we mustn't be left behind

Industry **Doubling the pace of automation could boost growth.**

Mark Eggleton

Could Australia become an artificial intelligence (AI) powerhouse by 2030 if we doubled our pace of automation as suggested in the report, *The Automation Advantage*, commissioned by Google and undertaken earlier this year by AlphaBeta?

According to the report, doubling the pace of automation could provide a strong catalyst for economic growth provided the right policies are put in place and business gets behind the push. Citing Deloitte's 2016 Global Manufacturing Competitiveness Index (GMCI), which says the US will be the world's most competitive manufacturing destination by the end of the decade, the report reasons if we follow the US example towards automation, the upside is enormous.

Much depends on the research you cite to back up your argument. A recent McKinsey Global Institute report suggests China's current rate of AI-driven automation could boost its GDP by 1 per cent annually, which would probably keep China in the number one position and not the US.

Either way, the consensus from the global professional services firms as well as the World Economic Forum seems to be AI-driven automation will spur productivity and prosperity globally. The reason is automation is primarily designed to drive human productivity and not human redundancy.

In a survey in June by Microsoft and Accenture's business technology joint venture Avanade, the understanding was organisations cannot drive any more productivity out of optimisation approaches such as industrialisation and labour arbitrage. The answer does lie with AI as it will augment the human workforce and free employees from the more mundane tasks.

The global survey of business and technology executives found that 31 per cent of organisations have already started using intelligent automation to break through the productivity plateau, with that number set to double by 2020. Moreover, 86 per cent of survey respondents believe they must deploy intelligent automation to be a leader in their field.

From left, moderator Ian Grayson, Sarah Adam-Gedge and Adam Driussi at the roundtable. PHOTO: DEAN SEWELL/OCULI PHOTOS

The problem for Australia, according to Avanade Australia's managing director Sarah Adam-Gedge, is we are already a fair way behind the rest of the world. Moreover, Adam-Gedge believes we have fallen to a point where the government really needs to provide more incentives for business to automate as well as offer more to companies offshore so they will invest in Australia.

Chief executive of data consultancy Quantium, Adam Driussi, suggests the onus should fall more on existing businesses than government assistance.

"Governments should help make education better, so that you've actually got better educated people coming out who make better decisions. Government should not get in the way of business. For example, they're currently getting in the way of us with their 457 visa changes so we're not allowed to hire people who will help our business grow," he says.

"As for funding to help business grow, we started our business without any funding and that goes to the heart of being an entrepreneur. We need people who can build a business that doesn't require funding."

Driussi, who was speaking at the recent AI roundtable co-hosted by *The Australian Financial Review* and the Australian Computer Society (ACS), also pointed out corporate Australia has often used the tyranny of distance as an excuse to not invest or innovate, but in the digital economy distance is no longer really a factor.

In the digital economy distance is no longer really a factor.

Shadow minister for the future workplace and the digital economy Ed Husic says that a fire has to be lit under corporate Australia when it comes to innovation because there is not any sustained investment in automation compared to other countries.

"What government needs to do is what it's supposed to do, which is in terms of education and investing in schools or removing regulatory hurdles," Husic says.

University of Technology Sydney's head of school, software in the faculty of engineering & IT, Michael Blumenstein, agrees there is a place for government support.

"It's usually in collaboration with industry and even the academic area. For example, Israel is successful because there's collaboration between government, academia and industry."

Avanade's Adam-Gedge says her view on what government support could be is wide-ranging.

"It could be lower corporate tax rates or it could be a policy change or focusing investment into an industry where Australia already enjoys some competitive advantage such as healthcare or agriculture."

Boards need to take a more active role

Governance

Mark Eggleton

Australia's leading companies need to have a better understanding of the rapid rise of artificial intelligence (AI) and what it means for their businesses.

Over the last couple of years, there has been a strong focus on big data and whether senior management actually understand what it means or how to use it but there is not much awareness of AI.

Participants at the recent AI roundtable co-hosted by *The Australian Financial Review* and the Australian Computer Society (ACS) all agreed it was time for boards to get up to speed.

"Every board of a major ASX company is telling their CEO they've got to have a data analytics story; they've got to have a big data story but they're not yet telling them they have to have an AI or machine learning story," said the principal at Data Synergies, Peter Leonard.

"The boards probably don't even know what machine learning or AI is. For me, the first step is to simply get the level of awareness in the business community to the stage where the board is forcing the CEO to do something."

Managing director of Avanade Australia, Sarah Adam-Gedge said the problem with many local boards is they only choose to think about AI or disruption when they are threatened by technology or a new competitor.

Shadow minister for employment services, workforce participation and future of work and the digital economy, Ed Husic said the problem is generational as there is a "digital illiteracy in older generations that have been calling the shots in management versus the new generation of management coming through".

Adam-Gedge acknowledged there is an age issues around boards and management but in a recent global survey undertaken by Avanade on automation, more than half of global business leaders believe that an understanding of new and emerging technologies, such as AI, will be more important for leadership than traditional specialisations like sales and marketing by 2022.

Robot technology could spur growth

Training Australia must move quickly to be globally competitive.

Mark Eggleton

Depending on whom you believe, technology is going to automate and destroy more than 50 per cent of all jobs or it is going to usher in a new age or new wave of careers.

The real answer lies somewhere in between. In fact, the things that really need to worry about their jobs are the current generation of robot technology because they will be superseded, but they cannot think for themselves … or can they?

The recent report, *The Automation Advantage*, commissioned by Google and conducted by AlphaBeta, found automation presents a $2.2 trillion opportunity for the Australian economy and could potentially create millions of jobs.

The report found Australia lags behind the rest of the world with only 9 per cent of listed companies making sustained investments in automation, compared with more than 20 per cent in the United States and nearly 14 per cent in leading automation nations globally.

According to the report, if Australia accelerated its automation uptake it would stand to gain up to another $1 trillion over the next 15 years.

The report also found only 29 per cent of automation-driven workplace change will involve workers changing jobs.

Of this 29 per cent, automation will likely create new jobs for those displaced workers. In fact, if anything, the report suggests automation will be like previous periods of technological advancement and there will be a wave of new jobs created.

Yet while the potential is strong, Australia really needs to move quickly if we want to be globally competitive in the digital age. What it will take is a concerted and combined effort from government, the corporate sector, education providers and trade unions to prepare people for the automation age.

Part of that preparation involves ensuring people receive the right type of education and retraining. This might mean more of a focus on the science, technology, engineering and mathematics disciplines, but it also means making people aware of the breadth of AI's potential.

Labor's Ed Husic warned there was a large cohort of workers worried about their future. PHOTO: DEAN SEWELL/OCULI PHOTOS

Speaking at the recent AI roundtable co-hosted by *The Australian Financial Review* and the Australian Computer Society, IBM Research's vice-president and lab director Joanna Batstone said AI was not just about transforming traditional computer science-based technology industries, "it's already starting to have an impact in the creative industries".

"People are using AI natural language processing techniques to write poetry, to write music, to analyse patterns in music to create movie trailers by doing visual recognition," Batstone said.

She said we can inspire people about the skill sets we will need in the future by showing the opportunities AI affords.

"Showing that it can transform movies, theatre, poetry and art is just as important as showing how it can transform computer science."

AI is already starting to have an impact in the creative industries.

Yet while it is easy to motivate the next generation about automation, fellow roundtable participant Ed Husic who is the federal shadow spokesman for employment services, workforce participation, future of work and the digital economy, warned there is a large cohort of workers worried about their future.

He says a huge number of jobs will be affected and we are not having the right conversations about how we are going to "reskill" those people.

"We're going to have to," Husic said. "We really need to work out how we do that.

"The challenge is we have a cohort of people in the middle who were trained up with the belief that if they went to school, TAFE or university and picked up a bunch of skills, they would be in a job.

"They knew if they changed jobs, the new job would pretty much involve the same skill set all the way through.

"Now, they're going to be doing all these different roles which require different skills, so how do we improve the ability to acquire skills in a shorter space of time so people will be able to get the next job?"

According to Batstone and other roundtable participants, it comes down to the notion of lifelong learning which is easier said than done.

"As the world moves to AI, we have to retrain and reskill our own workforce. It has to be a focus on learning, skilling, retraining and educating and bringing your workforce, your community along," she said.

For Batstone, this will require new learning styles, techniques and technologies. It will mean more personalised learning, or as roundtable participant Dr Ian Oppermann suggested, "micro-credentials".

Dr Oppermann, who is the CEO of the NSW Data Analytics Centre, said vocational education would not need to be acquired in the traditional manner of a university or TAFE, it could be a whole series of micro-credentials or courses delivered to an individual.

Interestingly, Michael Blumenstein, who is the head of school, software in the Faculty of Engineering and IT at the University of Technology Sydney (UTS), said universities were already embracing micro-credentialling especially in post-graduate studies.

"People want flexibility and they know something's coming and they want to change," he said. "They want to upskill, but they don't have the time to do it. So, this micro-credentialling can actually be used as a way to actually do little things over time at your discretion, whenever you want, but then pack it together to actually give a qualification that's recognised."

Dr Oppermann pointed out one place where AI was already playing a role in planning for the future is in the TAFE system in New South Wales. He said AI was currently reading every TAFE course description in the state and also reading every job ad online in all of Australia and it was looking at where the skills were needed.

"It's doing a simple supply and demand match through the NSW Data Analytics Centre," he said. "We're looking at where we've got over- or under-investment and looking at the trends of jobs in the regions.

"Furthermore, we're also looking at course compositions and asking how could you take this bit of a course and put it into another course? It means creating little sub-sections of courses, an eight-hour part of a TAFE course."

The point of doing this is to create the micro-credentials people will need.

Confronting the new reality

Innovation

James Sherbon

Artificial intelligence is already impacting millions of people. By the end of this year, IBM Research's lab director Joanna Batstone says, there will be more than a billion people touching IBM's Watson technologies in some form or other.

"If you pick up your phone and you check the weather company, it's powered by Watson. If driving a number of luxury car brands that have all kinds of electronic intelligence in the car, they're leveraging some of the APIs from the Watson platform," she says.

"So, the point is AI technology is getting into the hands of the end user very quickly and the reason for that is because it drives a value proposition and people are embracing that new technology," Batstone recently told an AI roundtable co-hosted by *The Australian Financial Review* and the Australian Computer Society (ACS).

Yet while the future is now when it comes to AI, the key question is how will it evolve? More pertinently, is it really going to be the greatest invention in our lifetime?

A roundtable participant, Peter Leonard, who is the principal of Data Synergies, referenced an episode of ABC-TV's *You Can't Ask That*, in which centenarians nominated the washing machine as the greatest innovation of their lifetime – greater than the motor car, aircraft travel or nuclear weapons. The reason was it saved more time and arduous labour in the home than anything else.

Leonard wondered what AI will deliver to the consumer? How will it change lives truly for the better beyond digital novelties?

Chief executive officer of the New South Wales Data Analytics Centre Dr Ian Oppermann says everyone will benefit, especially in certain workplaces. "Teachers will be better informed to teach and doctors will be better informed to diagnose," he says.

Ian Opperman: "One really interesting benefit will be an increasing degree of personalisation and flexibility in everything we do." PHOTO: DEAN SEWELL/OCULI PHOTOS

"Some professional services will be impacted such as junior level lawyers and accountants but one really interesting benefit will be an increasing degree of personalisation and flexibility in everything we do."

Leonard sees two big prizes for Australia's economy as long as we start moving quickly.

"For one, where the machines are will be irrelevant, so the age-old tyranny of distance or the need to scale will not be important because any organisation can access IBM Watson, Google DeepMind or any other intelligent system and those systems can be from anywhere in the world.

Building a world-scale business from Australia will be easier than ever.
Peter Leonard, Data Synergies

"So, if you're developing applications that rely upon deep intelligence and analysis of data you can do it as well here in Australia as you can do it in Iceland or Silicon Valley or anywhere else in the world so long as there's good broadband back to wherever in the world you're wanting to deliver the service to.

"Secondly, building a world-scale business from Australia will be easier than ever before because many of these future enterprises will be service businesses.

"The real grunt will be provided by the support service, which can be done from Australia with the service delivery overseen on the ground by a relatively small crew in the relevant other countries."

IBM research vice-president and lab director Joanna Batstone at the AI roundtable. PHOTO: DEAN SEWELL

Setting the framework for effective regulation

Ethics Experts ponder the issues in a fast-moving field.

Mark Eggleton

One of the reasons HBO's *Westworld* is such compelling television is its focus on the consciousness of the hosts. Rather than the hosts following the well-trodden dystopian killer robot path, they seem to be searching for a human truth as their minds crunch through the algorithms of their human handlers.

While the program is primarily a gorgeous looking confection, its broader themes do examine some of the ethical questions associated with artificial intelligence (AI). Questions such as how far do we let it evolve? Will it always rely on human programming, and where is the AI we already take for granted leading us?

Speaking at a recent AI roundtable co-hosted by *The Australian Financial Review* and the Australian Computer Society (ACS), the chief executive officer of the NSW Data Analytics Centre, Dr Ian Oppermann, suggested there are number of questions we need to ask as AI develops more rapidly.

"We will see more smart devices and to some extent the rules are going to be governed by what's acceptable in the marketplace on one hand and improved government regulation on the other. The really big question is … just because we can, should we?

Dr Oppermann's views echo the cautious tone of physicist Stephen Hawking and, more recently, Elon Musk. He wonders about the possible and the ethics about what we are doing.

The ethics behind what we are doing saw most of Silicon Valley's technology giants pledge to work together to ensure the AI tools they develop are safe. They also co-signed in 2015 an open letter committing themselves to not developing autonomous weapons, but Oppermann's concern is that we do not fully understand the art of the possible so we may not be asking the right questions of ourselves right now.

For example, we are not asking what the ethics are behind setting up a weapon that fires at will and kills. Similarly, the ethics around whether a self-driving vehicle hits the pedestrians or kills the driver? They are different ethical questions than you would ask of a human soldier or driver under the same circumstances.

Oppermann said we should not be afraid to continue developing AI as we must be "bold about exploring the limits but we should also build in new regulations" and provide an ethical reference framework for people.

Michael Blumenstein, the Head of School in the Faculty of Engineering & IT at the University of Technology Sydney (UTS), suggests we are being a little alarmist about where AI is taking us because we are a long way away from the "Terminator situation".

He suggests the people behind the creation of AI and machine learning are primarily engineers and scientists who want to provide a technology that augments our human world.

"Engineers don't say we're going to build a safe bridge, they say we're going to build a bridge. It's implied in his or her work, they're already building a structure that's going to be safe, so we should take the same perspective on artificial intelligence," Blumenstein said.

The really big question is … just because we can, should we?
Dr Ian Oppermann, CEO NSW Data Analytics Centre

Conversely, Blumenstein said we would not really know when we cross the line and machines become sentient and where there is potential for things to go awry.

"Things are moving so quickly, we can't forecast for it and it's going to be very difficult to regulate and I don't think governments will be fast enough to keep up with the technology. We just need to be cautiously optimistic things will go in the correct direction."

IBM research vice-president and lab director Joanna Batstone is rather more sanguine and suggests one of the fundamental purposes of AI is for it to augment human activity.

"It's not about replacing humans, it's about augmentation," Batstone said. "What we need to do is build trust and transparency in new technologies and the way you build societal trust is by observing ethical responsibility to set in place government standards and privacy standards around data and that's a partnership between the public and private sector."

Batstone said IBM had engaged early in the conversation around what responsible AI meant across the political and public spectrum.

Sarah Adam-Gedge, the managing director of Microsoft and Accenture's business technology joint venture Avanade Australia, suggested the future of AI and ethics was extraordinarily complex.

"You will need a combination of insights and people to come up with the answers to the bigger questions. We need to ask what are the intended and the unintended consequences of a new technology?

"At Avanade, we believe there are far-reaching consequences and organisations need to own it, but the studies we've done have shown organisations are thinking about it but, they haven't necessarily put the frameworks in place to enable people to make sure the technologies they're building just have the positive consequences that were intended.

"So, I think there do need to be guidelines and frameworks [around AI] and we obviously need to make sure in a business and a government sense there are good security frameworks around safeguarding people's data."

Peter Leonard, principal of Data Synergies, suggested it was hard to regulate an area "where you don't even know how people are going to use the technology".

"There is a big difference between artificial intelligence and fully autonomous agents," Leonard said, "so most artificial intelligence is really about enabling machines to assist us to make decisions better. I think for many of the applications of AI where the machine intelligence is supplementing human intelligence there's no need for change of existing regulation."

In regard to fully autonomous agents, Leonard suggested a fairly simple solution. "The person who programs and enables the device should be responsible for the consequences of what follows."

Industry Insight

Industry comment by
Anthony Wong
President of the Australian Computer Society

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Inevitably when we ascribe intelligence to something, questions of ethics will soon follow.

As we progress to a future where artificial intelligence (AI) has the potential to affect many areas of our lives, it's no surprise that heated debates around employment, security, public safety, rights of robots, regulation, and social and ethical considerations are now bubbling to the surface.

Recently I was involved in a number of expert panels on the potential challenges and social consequences of AI at the International Joint Conference on Artificial Intelligence (IJCAI) in Melbourne. The debates and discussions were fascinating and insightful, but if there was one take-away, it's that we're only seeing the tip of the iceberg.

The big players – Amazon, Facebook, Google, IBM and Microsoft – have already formed the non-profit The Partnership for AI to "study and formulate best practices on AI technologies, to advance the public's understanding of AI, and to serve as an open platform for discussion and engagement".

Another non-profit, OpenAI, with Elon Musk and Sam Altman of Y Combinator, aims to discover and enact "the path to safe artificial general intelligence".

When it comes to ethics, it's a multi-dimensional issue.

Beyond the decisions made by intelligent autonomous machines in the future – "should the autonomous car save the driver or the pedestrians?" is a prominent recent discussion – we first need to recognise that responsible AI development calls for the incorporation of ethical and social values at the design stage by programmers and engineers.

Which naturally leads to: whose ethical and social values? What biases do we build in – intentionally or otherwise – that will affect the output? Each individual, socio-cultural group, and national geography can have different attitudes to ethics, morality and legality.

This is further complicated by the choice of data used to train AI systems. Even the best-laid intentions can go awry if the data itself breaks our ethical standards.

And just last week it was revealed the Australian government had rolled out the use of an algorithm across its immigration detention centres to determine the security-risk of detainees, replacing decision making by humans. Titled SRAT (Security Risk Assessment Tool), it considers data around past behaviour, age, health and known associates. Its focus is narrow, but it nonetheless makes decisions on the welfare of people.

According to the government, incidents of assault and self-harm have reduced since its implementation, but it has been criticised that it doesn't take into account rehabilitation or changes in mental health.

It's an interesting quandary. How much responsibility should we give to algorithms shielded behind mathematical "impartiality"?

As machine learning develops it can become difficult to articulate the inner workings. Facebook recently shut down two AI chatbots after they unexpectedly started to develop their own language, demonstrating the capability for the bots to create their own meaning. And as ethics are simply meanings we choose to ascribe, can we expect AI to act ethically if it can create its own?

Responsible AI calls for the incorporation of ethical and social values at the design stage.

Clearly the times ahead are interesting and challenging as we come to grips with what it means to regulate in a world of automated decision-making systems.

The EU has already acted with a General Data Protection Regulation, coming into force in 2018, providing an individual with the "right to explanation" to automated decision making where the individual's interests have been significantly affected. There is also a right to appeal a decision.

For the first time, technology is not only automating the repetitive and the manual, but also gradually supplementing and mimicking our "minds".

As algorithmic complexity and autonomy increase, it becomes ever more important to build in checks and balances – to not just explore, but hopefully ensure, a future of ethical design.

When it comes to ethics, it's a multi-dimensional issue.

Impact to spread across sectors

Business software AI will be imbedded in almost every product.

Ian Grayson

Rapid advances in artificial intelligence will result in fundamental changes across the business landscape within the next few years, according to technology experts.

Powered by sophisticated algorithms and with the ability to learn over time, artificial intelligence (AI) will be increasingly used in everything from accounting and legal analysis tools to heavy machinery and autonomous cars.

According to predictions by research firm Gartner, AI technology will be embedded in virtually every new business software product by 2020. The firm says that, by that time, AI will have become a top-five investment priority for more than 30 per cent of all corporate chief information officers.

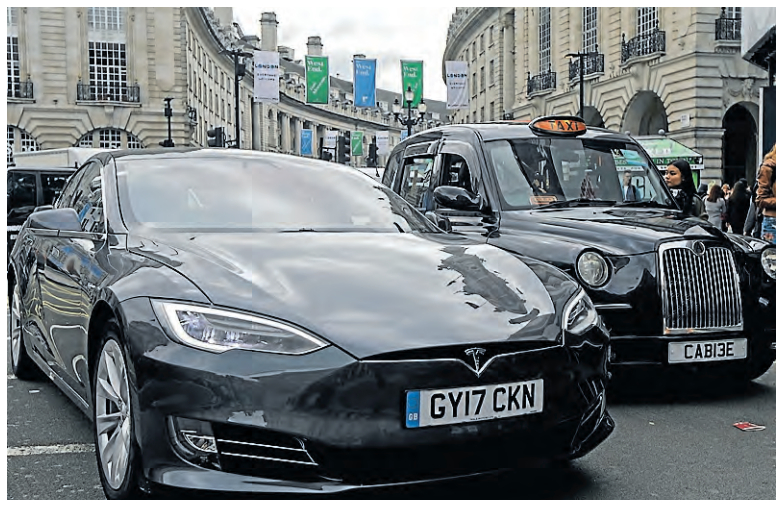
"I think it can fundamentally transform everything that we do which can be characterised as a service," says NSW chief data scientist and chief executive of the Data Analytics Centre, Ian Oppermann. "I think it will be as fundamental as electricity. Electricity has changed not only the way we see the world, but also the way that we use labour-saving devices and how we communicate."

Oppermann says the use cases for electricity evolved from simply turning on lights to automating machinery, to the point where it now underpins almost everything. He believes AI will follow a similar path.

At a recent round-table discussion, co-hosted by *The Australian Financial Review* and the Australian Computer Society, participants agreed AI started out almost as a technical novelty, used mostly in computer games, but is now being rapidly adopted across a broad range of areas.

According to a global survey by technology company Avanade, 31 per cent of organisations have already begun using intelligent automation to improve productivity, and this number is predicted to double during the next three years. Of those who responded to the survey, 86 per cent believe they must deploy intelligent automation to be a leader in their field.

"I think the point about moving from gaming into transformation of business is the tipping point that we're at right now," says Joanna Batstone, vice-president and lab director for IBM Research Australia.



Autonomous cars are just the start of the AI revolution. PHOTO: BLOOMBERG

"We've been finding here in Australia a lot of early-adopter projects with industry, where we're now looking at how we can use those technologies to transform a financial services company's credit risk modelling, or an oil and gas company's insight into their data.

"Business adoption of those technologies is already happening [but] I think the consumer in the street is less aware of how much that AI technology is already starting to impact business."

Peter Leonard, principal of Data Synergies, says this awareness will change as tools emerge that make interacting with AI-driven applications easier.

"I think consumers will pick up those kinds of applications quite quickly and, as a result of that, they will increasingly expect AI-driven services to be available and will pay real value for those services," he says.

The round table participants point to the accounting and legal sectors as two that will experience significant disruption from AI in the short to medium term. Many tasks that previously have been undertaken by junior staff will readily be handled by AI.

For example, the task of trawling through large quantities of case law to determine the likelihood of a new case succeeding could traditionally have occupied a team of young lawyers for days or even weeks. Such a task could be completed by an IT tool in just minutes.

Similar efficiency benefits will also been seen within accounting firms where many low-level, repetitive tasks can be handled by software rather than humans.

As the capabilities of the tools increases, their usage will shift into other areas of business.

Oppermann says further strides will be made as AI allows the ongoing development of fully autonomous devices, such as driverless cars and trucks. These have the potential to radically change the economics of supply chains and streamline transportation.

"The ability to encapsulate the physical world and the digital world to do future possible scenario planning … will change everything which is information driven, everything which is service focused and everything which ultimately can translate as value creation," he says. "I think we're probably, in terms of the technical capability of AI, still only in the fairly early days."

Michael Blumenstein, head of school, software at the Faculty of Engineering and IT at UTS, points out that AI has been in development since the 1940s when the first artificial neuron was created.

"You've had this evolution and decline of AI for many decades now," he says. "Some people, because this is the first time they've actually been exposed to it, think this is the first time it's ever flared up like this."

Blumenstein says AI development had stalled in the past because it never really lived up to expectations.

"So the challenge … is to say whether in this iteration it will live up to expectations," he says.

"Because we can talk about beating games, or we can talk about doing computer vision and that's all great, but the promise of general AI, which means an AI that can do many things well, not just one thing well, is still out of our reach."