IDEAS 22: EXPLORING ARTIFICIAL INTELLIGENCE

The value of an investment, and any income from it, can fall as well as rise and investors may not get back the amount invested.

MB

Hello, and welcome to our annual IDEAS Conference. I'm Malcolm Borthwick, Managing Editor at Baillie Gifford. 21 October 1879 was a day for the history books. It's the day that the American inventor, Thomas Edison, developed the world's first commercially viable lightbulb. But in doing so, Edison did much more than just find a way of illuminating our homes, our streets and our offices. Edison unleashed electricity on the world.

Within three years of his invention, electricity power stations were built in New York and London. And economists have described electricity as the most influential general purpose technology ever. That's because it's everywhere, it's ubiquitous, and also, it has led to innovation after innovation.

So, for example, it's helped to modernise our factories. It's also made our household chores a lot easier through powering vacuum cleaners, washing machines and refrigerators. And it has led to an entertainment revolution through powering our radios and televisions.

However, the impact of artificial intelligence could be even more significant. That's because the infrastructure to support it is already in place, according to the futurologist, Martin Ford. So if we think back to electricity, we had to build the power stations and also the transmission cables. However, with artificial intelligence or AI, we already have computers, we already have the internet and data centres and sensory-packed smartphones to help fuel its ascent.

So our job as investors is to try and understand the value that artificial intelligence could unlock, and the investment opportunities it could create over the next decade and beyond. So to discuss this, I'm joined by Kirsty Gibson from the US Equities team and Julia Angeles from the Health Innovation team. Kirsty, Julia, great to have you with us.

KG

Thanks very much for having me.

JA

Happy to be here.

MB

And just a reminder, the conference is 45 minutes. Julia, Kirsty and I will chat for the first 25 minutes, 30 minutes or so, and then we'll go to your questions for the last 15 minutes. And we'd love to hear from you if you do have questions, but don't wait for the last 15 minutes to ask them. Ask them any time during the course of the discussion. And the email address to send your questions to is events@bailliegifford.com. That's events@bailliegifford.com.

And just a reminder, this conference is being simultaneously translated into lots of different languages, into French, Chinese, Japanese, Korean and Thai. So if you want to select any of those options, please go to the bottom left-hand corner of your screen and choose one of those languages. So let's start the discussion. Kirsty, what is artificial intelligence?

KG

Thank you, Malcolm. Well, I think this is a really good starting point, because I think whenever I think of artificial intelligence, my mind instantly leaps to Ex Machina or Skynet in The Terminator. But the reality is the topic is just much broader than that.

So artificial intelligence is a technology that enables a machine to simulate human behaviour. It's like an artificial brain, but it's a super brain. And then we have terms like machine learning, which is a subset of artificial intelligence. And what that is looking to do is to automatically enable a machine to learn from past data without being explicitly programmed to do so.

So with AI, we're looking for an intelligent system to replicate a specific task as a human would, whereas with machine learning, what we're doing is to teach a machine, using past data, to perform a particular task, and to do that with a high degree of accuracy. So that might be something like, can you recognise, from these millions of pictures that you're presented with, which of these moles are cancerous and which are not?

And then just to add confusion to all these new terms, machine learning is how an AI learns. So machine learning is how an AI develops its intelligence. And then we have subsets of machine learning, things like neural networks and deep learning, and these are about how that learning is structured. So it's about models are given more freedom. They are supervised less in order to learn.

So I like to think of artificial intelligence as a little bit of a spectrum. At the one end, you have machine learning, a kind of bare bones, real data crunching end of the machine learning spectrum. Is there a cat in this picture or is there not? And then at the other end of the spectrum, you have the general AI, which would be if you are presenting this AI with an unfamiliar ask, are they able to start generating a solution to that?

So I think, and I'm no expert in AI, but I think a really useful analogy that's helped me to bring all those pieces of that jigsaw together is to think of a toddler. And if you think about how a toddler learns, they start off learning through being taught, through practicing and through receiving feedback. And that's like that machine learning phase. Then you have the fact that the toddlers then take that information and then they start experimenting, maybe getting themselves into a little bit of trouble here and there. And that's like that neural network phase.

And then finally, they start teaching themselves, and that's because they've developed the necessary algorithms in order to do so. They have the algorithms in their mind to be able to do that. And that's like that general AI phase, the main difference I guess being between a general AI and a toddler the sheer quantity of data that they're able to consume, and also the speed at which they learn is quite different.

So I think what that serves to illustrate is that when I conceptualised AI at the beginning there, it sounds like something that's in the future. But the reality is, it is here and now. With those machine learning and neural network phases, whilst they are still early in their opportunity, they are much more mature than that general AI, which still remains an opportunity for the future.

MB

I love the way that you describe the different ends of the spectrum with AI. It's also, I think, fair to say there are a lot of differing opinions on that spectrum about artificial intelligence. And it was interesting chatting to friends and colleagues just in the run-up to this conference, because it is something that divides opinion. But I think that's quite natural in the sense that new technology often both fascinates and frightens people. Is that just human nature, Julia?

JA

No, absolutely. And despite that Kirsty made it so easy, the way she explained what AI is, but it is a very complex technology. And anything complex tends to frighten humankind and it's very understandable. If you think about AI, it's probably even the most frightening technology out there.

First of all, it's sort of invisible. You don't even realise it's already here. And it works, it builds on semiconductor chips. So it's a software that needs semiconductor chips to run on. And we can almost think about it as a living organism. So the semi cell silicon is its body and the small transistors are its beating hearts, many, many hearts that make it so efficient.

But what is even more powerful is that it's itself learning, but also, sometimes we don't really even understand how AI actually comes to certain conclusions and decisions. And that means we are losing control of that technology. And when we are losing control, we naturally feel very uncomfortable.

So in many ways, I'm trying to say, yes, it could be scary, but at the same time, what is actually the way out of scare and being frightened is actually knowledge, it's information, it's trying to

understand what technology is, what potential it is for humanity and what potential dangers and abuse of the technology.

And in that context, I believe that regulation is going to play a role there to help us normal human beings. But it's also not just, say, up to regulators, because they can overregulate and they actually don't understand the technology, but it's also up to the companies who are developing technologies. We call it bottom-up ethical practices on the company level, because they do understand all the details and how they develop technologies. They are responsible of doing it in an ethical way so that it doesn't get abused.

And actually, there are already examples of the companies that actually are trying to really enforce those ethical practices. For example, I came across a company that develops emotional AI. And immediately when we think about emotional AI, our fantasy can go very quickly into how it can be used for the good purposes but also can be abused in surveillance, for example.

And this company has been approached by different governments for that sort of application, and they just said no, it's not what they want to develop this technology for. And actually, also their bonus scheme for the developers is linked to how they can actually remove the bias out of data. So it is kind of… So we already see companies are trying to do it responsibly and they also try to send strong signals to the society out there. And we just need more of those.

MB

And is emotional AI something that simulates our emotions, is it? Is that…?

JA

Yes. So it's a machine that actually can start reading how we feel. So it's based on our language, on our facial expression and our body language. So it's still a minefield, but they made really incredible progress.

MB

And we'll come back to ethics a little bit later in the discussion, but I wanted to just really move to the investment opportunity, Kirsty. As, Julia, you say, a lot of AI is already here, but what's the scale of the opportunity for investors with artificial intelligence?

KG

I think that's a really interesting question but it's a really difficult question to answer. So I think I'd probably approach that from two directions, from a theoretical perspective, and then hopefully we can move on and discuss some company specifics.

So I think, to start with, it's the recognition that machine learning and artificial intelligence have been in existence for the best part of 60 years. And what's really changed over the past decade or so has been this massive explosion in the sheer quantity of data that we have around us. And that's been enabled by things like sensors, but it's also been enabled by computing power, the

chips that we have that are able to generate data, to collect that data, and our ability to store it through things like cloud computing.

And what's most interesting for me is that data explosion has not been specific to just one or two industry verticals. It's not just been e-commerce. It's not just been advertising or social media. It's across the different spectrum.

It includes manufacturing companies that have sensors that are monitoring how they're manufacturing, monitoring things to try and pre-empt whether there's going to be a fault. And so that data explosion is vast, and it's been across industries. And I think that is a good starting point on how to think about the scale of the opportunity. It is potentially vast as well.

I think the other way to potentially think about it is I read a book recently called Competing in the Age of AI. And it talks about this concept of an exponential system coming into contact with a saturated one. And it's this idea that the more people embrace data and machine learning and artificial intelligence, the more others are going to have to do so, because you simply cannot compete with a system that is moving that fast. Any industry that doesn't embrace what is currently happening is going to be left behind.

And I think part of this comes from the fact that AI breaks down siloes within businesses. So it used to be that you'd have marketing data and product data and sales data and HR data. And ultimately, in order to generate insights that potentially humans are not aware of, we have to bring all that data together. We bring all those data sets together, store them in a cloud offering, and we can then analyse them and we can run various models.

So that's breaking down the siloes within industries, but then you're also seeing the breaking down of traditional industry verticals themselves. And we saw this with the emergence of something like Alibaba, the e-commerce giant in China, moving into what has traditionally been a very high barrier to entry market, which is banking. And they could do that not just because they wanted to and they needed to, but they had the data, they had the knowledge base to move into that different industry vertical.

And I think that speaks to just a broader and more interesting point, which is when you see a new technology, if that's the right word to describe artificial intelligence, emerge, it's not just about replacement. It's also about unlocking new opportunities and new ways of doing things. And that is also suggestive to me of the potential scale of opportunity that's here.

MB

Yes, and that data is really significant, as you're saying. Julia, your area of focus in the Health Innovation strategy is healthcare clearly. Give me some examples of where you're seeing artificial intelligence being used in healthcare.

JA

Yes, no, I just agree with Kirsty so much when she talks about big data, that convergence of data and AI and what a difference it can make for different industries. And I think healthcare is probably one which is really ripe for massive change.

And also, if we think about the human biology, it's probably the most complex system out there. And the way we studied it in the past, it was, as you say, siloes, because we haven't been able first to gather relevant data to different parts of biology, but also integrate it in a thoughtful way. And first time actually in human history, we are actually in a position to do it.

And the reason why we can do it, first, we can gather all the relevant data to human biology, like genomics, proteomics, its microbiome. So microbiome is bugs that live in our gut. So we can pull all this data. And it's just trillions of data points. It's not just… And it's a massive complexity.

So I call biology actually a problem of large numbers, massive numbers. And then when you combine it with artificial intelligence, suddenly you have an opportunity actually to unlock this complexity, and then healthcare is actually going through the massive transformation.

So first this technology is used to understand the biology. And when we start understanding the human biology, we can start studying diseases and what actually leads to… What the underlying sources of disease is. If we understand that, we can start developing diagnostic tools that are very much precise, and we can start diagnosing diseases much earlier in their evolution.

But beyond that, we can also develop proper targets for diseases, so those much more precise targets. And also, we can develop medicines from bottom up, designing small molecule drugs or messenger RNA by actually applying artificial intelligence.

And just to provide two examples of some of the companies we are really excited about, like Moderna. So many people are familiar with Moderna because we know what messenger RNA is already and how that impacted our ability to fight against COVID-19.

But what many people don't know, that actually, in order to design the messenger RNA vaccine, AI also is used actually to design the sequence. Because the way you put the sequence together for the spike protein, it would impact how it expresses in your body in quantities, so to make it more effective, to reduce the immune response. So it's actually a very powerful technology just in the design stage.

But also, Moderna is using AI to possibly predict how a virus is going to mutate over time, before it's actually mutated. And that could put us in a much stronger position actually in the pandemic preparedness, or endemic, so we can actually be in advance of virus rather than keep chasing it. So this is entirely transformative, the way we can potentially treat infectious diseases. So this is just one of the examples.

And another one which also I really think is quite cool is a company called Exscientia. They build small molecule drugs atom by atom by using AI. And the advantage of doing that approach, by using that technology, is that traditionally… Because the way we used to design drugs is

optimising first for efficacy and then for safety. And normally, drugs actually fail because of the safety. So because they are very potent, but then they attack everything else in the body, that makes them unusable.

But if we could optimise in parallel for those two things so there is trade-offs between efficacy and safety, suddenly we actually have a higher chance of those drugs coming and actually working for patients. And that's exactly what Exscientia does. They're using artificial intelligence to optimise for those two properties simultaneously. And we can already see that those drugs are very, very different.

So it's entirely reinventing how we approach health in many ways, but as I mentioned, it's a spectrum. So it's not just one area. It's just it's so broad. And that may be to your point, Kirsty. It's across many industries, but when you start also going deeper in one particular industry, you also see the breadth of the application. It's just not one thing.

MB

It's interesting. I think the benefits of artificial intelligence in healthcare is often something which is underestimated in terms of how significant it is, because this is a massive problem in terms of costs. So if we look at US healthcare spend between 1970 and 2019, healthcare spending in the US as a percentage of GDP has more than doubled. So it's increased from 7% to around about 18%, which is massive. You talk about that convergence point between science and data. So will AI hopefully bring down healthcare costs over time?

JA

Well, that's a hope, and probably it's not just a hope. We're already seeing somehow companies actually… By utilising these technologies, they increase the efficiency on their invested capital. Moderna is one example. But yes, so traditionally, the reason why health… There are many different reasons why healthcare is expensive, but we can just maybe stay with drugs, just drugs in themselves.

And they are very difficult to develop because of the complexity of human biology. So normally, it takes more than ten years, it takes billions of Dollars, and then the chance of success is around 10%. So it's a very, very difficult industry to be in. And then, of course, in order to compensate for all this risk-taking and capital, the pharma company is charging quite high prices.

But with AI, we can potentially have an opportunity to entirely reinvent the business models in drug development. And it's just because we're coming out of the darkness, when you talk about the light. And I feel like AI… Even though light makes such a difference, but within biology, we are still pretty much in a dark box.

And AI has an opportunity to bring us out of the darkness because we start finally getting some control over the complexity, biological complexity, and derisking the drug development. And when we're changing the risk profile, suddenly the economics looks very different. And that would eventually play into the overall cost of healthcare.

MB

And don't forget to ask questions. If you do have questions, the email address to use is events@bailliegifford.com. That's events@bailliegifford.com. We'll be coming to your questions shortly. Kirsty, let's look at some other sectors that you're looking at from an investment perspective that's interesting you.

KG

Yes, I think the core point that we both touched on up to now is that ultimately, AI is a data problem and the fact is, as I mentioned in my last comments, that it is that that data collection is happening across industries. So there's a lot happening in lots of different industries.

So, for example, we can take something like the advertising industry. There's a company listed in the US called The Trade Desk. And what The Trade Desk is, is a demand-side, programmatic advertising platform. Now, that's a lot of words, but what that really means is that they use data to help their customers buy advertising. So if the three of us were watching the same television programme at home on a connected device, we can then be served advertisements that are relevant to each of us at the same ad break.

So what that does is it moves us from the world of who is the average viewer and who do I want to attract to who is actually watching this and how do I advertise to them in a relevant way. And that's possible because The Trade Desk can process over 12 million ads per second.

MB

Wow.

KG

That's one, just… I can't even begin to process how fast that is. But also, that's just something that a human would never be able to achieve. They also have a dedicated platform called its Koa platform, and that's designed for its customers. And that enables customers to… It means that they can automatically send advertising Dollars to those areas that are being successful and remove advertising Dollars from those areas that are struggling at any one point in time. That is a real-time thing.

Then you move to an industry like transportation. Now, we all know that Elon Musk and Tesla are looking to make autonomous vehicles. But there's a company in the US called Aurora that listed last year, and what Aurora is looking to do is autonomous trucking. Now, trucks are big, heavy pieces of machinery, and having them hurtling down a highway without somebody behind the wheel is potentially a scary prospect for people.

And what Aurora has been doing is training what's known as its Aurora Driver, and that driver is its autonomous software. And that driver, what they've been doing is training it and adding features over time. And the most recent feature that they've added is the ability for that driver to navigate roadworks.

And the challenge with roadworks is that many of these autonomous software companies, sorry, autonomous driving companies use sensors to understand whether or not you've moved out of your lane. Are you still in your lane? Now, the challenge with roadworks is it usually requires you to move out of your lane, and quite often, it requires you to cross multiple lanes to go around the blockage.

That's difficult to programme or difficult to learn about because it's not binary. It's not as simple as saying red light means stop, green light means go. It requires experience. No matter how many times you see roadworks, you're never going to see those precise roadworks. So that is about learning, and that is what the Aurora Driver has been doing. It's been learning, how do I use my previous experiences of roadworks, and how do I apply that to the situation I'm confronted with in real life?

And then you have an industry like insurance. And this is really interesting, because AI has the potential to not just disrupt the business model but also the product itself. So if you think, if you boil insurance down to what it fundamentally is, it's about data. It's about monetising statistics, and it's probability theory, which is ultimately what AI is looking to achieve as well.

And so how can AI disrupt the insurance industry? Well, it can actually disrupt the domain over which legacy players had over the one factor of production, and that's data and monetising that data. So data and statistics. Because these AI models in insurance can potentially come in, bringing in data that those legacy players don't even have access to or they've never collected data on, and that means that you develop a model in which others just can't compete.

So there's a company listed in the US called Lemonade Insurance, and they are embracing the power of artificial intelligence when it comes to their insurance offering. So they have an AI called AI Mia. And AI Mia is the… She deals with premiums, so policies.

And she asks 13 questions and collects over 1,700 data points through those questions, including things like how long did you spend answering a question, how many times have you visited the website, did you read all the terms and conditions, etc., and as a consequence of that, decides how to price your premium, and can price your premium therefore based on you as an individual, again, as I mentioned with The Trade Desk, rather than putting you in an average pool of what's expected of somebody within your demographic.

Then they also have AI Jim. And AI Jim deals with claims management. So if you need to make a claim on your insurance, you contact Lemonade, you're put in contact with AI Jim, and as long as that claim is within the guidelines of your policy, then it will pay out.

Now, the opportunity here is, one, to reduce the cost, as we saw in healthcare, to potentially reduce the cost of insurance. Because you'll be able to better identify the bad actors. You're not clubbed together. The good actors and bad actors are not clubbed together and given an average price. You can be priced as an individual. And the second thing is there's a potential to lower the cost for the companies operating in the industry, because the administrative burden of people phoning to make claims is taken on by an AI rather than humans.

JA

Just, sorry, I just find it fascinating. What you actually talk, Kirsty, about is a lot of personalisation. And the same theme actually is very powerful in the healthcare space. Because if you think about it, most of the drugs are developed for averages. And when you actually assess how effective are those drugs in real life, most of them actually don't work because either they're not effective or they cause very severe side effects.

And also, there is a paradigm shift in healthcare. Can we actually develop drugs first for more stratified populations based on, for example, their genomic profile, but also going much more personalised, truly patient by patient? And again, bringing Moderna back, they're working on the personalised cancer vaccine where each individual cancer is assessed for its profile and then the vaccine is developed specifically for that profile for that patient.

And without AI, you just can't do it. Because it's effective, it's quick, yes, and it's cheap. So this is the same kind of personalisation which we were not… We have not been able to approach it in that way without that technology.

MB

And one of the other areas that you work with, Julia, is often with our academic relationships as well. How are we trying to learn more about ethics and AI through those academic links?

JA

Yes. So academic relationships have always been important, as important to us as investors, to provide us additional insight on big trends, but also helping us to see potential blind spots we have as investors. And we always try to identify some of the best specialists and minds in different areas.

So in the case of ethics and AI, we are actually sponsoring a Chair in Ethics of Data and Artificial Intelligence in Edinburgh Futures Institute. Her name is Shannon Vallor, and she has been really helpful for us, to really help us to understand what are the big questions there, what we should be thinking about when we engage with companies.

Because as I said in the beginning, by the end of it, it's actually mostly companies' responsibilities to do the right thing. But sometimes, they also might be in the dark because they might not be aware what kind of unintended consequences their technology could lead to. And that's why it's very important to broaden the dialogue, to include people from different disciplines. And the work of Shannon is absolutely very, very helpful to us to be more also helpful to our companies we invest in.

MB

And we'll be coming to your questions shortly, but I just wanted to ask you one more question, Kirsty, before we did. You started the conversation by talking about the toddler maybe going through its growing pains in terms of growing up, and that correlation with artificial intelligence. How do you see that toddler developing over the next ten years or so?

KG

Yes. So I think you can use that analogy as well for the industry itself. So I think we're probably in that toddler stage. And then you probably see that potential for that childlike delight stage, all the excitement about what's possible. And then maybe you move into the moody teenage phase, where they're shut in their room, you don't know what's going on, it is a bit of a black box, we're not entirely sure what they're thinking, how they're thinking.

And I think that's the emergence of the general AI side of things, that it's hard to know exactly what's going on. But I think that in itself is less of a concern if you know, as when you're bringing up a teenager, that you've put the guidelines in place, that eventually they pop out as a valuable member of society, even if they went through a few growing pains at the time.

And I think it speaks to that idea of if you instil the right values and you recognise the potential biases and externalities of what you are trying to achieve, that as long as those are potentially in place before you start, you will go through those periods of not understanding, not knowing exactly what's going on, but you know there is a light after the darkness of hiding in your room for five years.

MB

It's this idea, isn't it, of artificial general intelligence, or AGI, that DeepMind, owned by Google parent, Alphabet, are trying to get to over the long term. But it's something, and you did talk about this earlier with Aurora, this idea of edge cases with roadblocks and a pigeon flying up. But it's hard to underestimate quite how difficult this is in terms of understanding consciousness, learning from mistakes. It's an extraordinarily difficult thing to do, isn't it?

KG

Yes. I think the challenge is that we don't really truly, as Julia mentioned earlier, even understand how our own brains work. We don't know how we make the connections that we do. We're potentially developing AIs that can understand emotion, but do they truly understand emotion yet? Because what people's faces say and their body language says, is that the same as what's in their head?

And we don't necessarily know how we arrive at the conclusions that we do. But ultimately, it's about making connections, and over time, AIs are making more and more connections, and they're making those connections at a faster pace because this is an exponentially improving technology.

MB

So let's go to some of the questions that are coming in. How can or should clients evaluate an asset manager's AI capabilities and whether or not that improves investment outcomes?

JA

So it's still too early to say whether it improves investment outcomes because, as long-term investors, feedback loops are quite long. But we can absolutely see ourselves how it can possibly augment investors. So we're experimenting and trying to see how AI could be introduced to our everyday life to help us to really focus on what matters, where actually we add value and certain tasks could be automated.

And the reason for that is because we just realise, especially in the healthcare space, innovation is just accelerating. There are hundreds and thousands of companies out there we could possibly be speaking to, but we just can't do that in any kind of human way because there is no time.

But also, our information sources also have been expanding. So we were mentioning our relationship with academics, but also, there is so much interest in literature out there, whether it's some scientific journals to blogs, and there is always something to read and keep learning. But again, the amount of information is just vast. Again, human brains, we are not capable of processing all that.

So AI is just such a valuable and handy tool that can come and help us with those things and really lead us… Almost play a role as a compass, a guiding compass, and help us with certain tasks, but also help us to focus on what matters and where we can add value.

But I would say, from the question, I think investors should be experimenting, but it's still too early to say how it's going to lead to the better decision outcomes. But we are quite optimistic, and that's why we're experimenting.

MB

And maybe you could tell us a little bit more about that experimenting, because you are working with AI at the moment in your team, aren't you?

JA

Yes. We have four data scientists that are working specifically on that project. And we have broken it up in many different blocks because we want to really make it manageable and get somewhere. But one of the exciting areas is, for example, analysing the networks of the people, of the management teams, of the board compositions, because there are so many interconnections and there is also a lot of information in digital form.

So that potentially could help us to assess the quality of the management teams, scientific credibility, also see people movement that could also work as a signal, if this company is one that attracts talent or one that loses talent. So there's a lot of signals we start picking up just on the people side.

And again, as human beings, of course, and I know Kirsty likes to do that, we can go and sit and study management and read a lot of biographies, histories, interconnections, but it's a very time consuming process, and it's just one input in the investment process. How, again, we can use AI to help us at least to build some base knowledge, and then, of course, with engagement with management directly, then we can actually deepen it.

And as I said, probably where AI will never enter is probably the meeting room with companies, because there's going to be ethical considerations there. But if AI is capable of reading emotions, it's probably going to do much more better conversation with management than even humans. But probably it will never happen, because there are limits to where we can actually allow this technology to play a role.

KG

I think you could argue, if the companies start being run by an AI and the investors are AI, they probably would rather have a conversation with each other and just exclude us.

MB

We've already had an AI that's applied for a patent earlier this year, didn't we?

KG

Yes.

JA

It's a part of the world.

KG

Yes.

JA

There's real people and then…

MB

So just another question that's come in about… Acknowledges a bit of The Terminator analogy that you had earlier in the discussion, Kirsty. AI could have huge potential benefits if it's developed carefully. There are experts in AI who are concerned that as AI systems become more powerful, they could lead to outcomes as bad as human extinction. Do you think enough is being done to mitigate this risk, and how would we at Baillie Gifford consider that? And any relevance to investing.

KG

So I think the starting point with a question like that is to try and think about what are some of the negative consequences of these kinds of technologies. And I think it's again thinking about that spectrum, and those externalities change along that spectrum itself.

So I think one of the areas that is talked about quite a lot is this idea of algorithmic bias. And ultimately, I don't think it's the bias itself that's the challenge. We are all biased, and there are huge biases in the world that we live in already. Julia knows this better than I do. But when you're running a clinical trial in healthcare, it's usually run on Caucasian males. It's not run on minorities. It's not run on women. And so therefore, the relevance of actually that data is… It's difficult to know how it's going to act within the general population.

But what the challenge of algorithmic bias is when it comes to AI is to do with the amplification of that bias. So if you're feeding a data set into a learning model and that data set has a bias in but you're feeding such large quantities, that bias is just going to be amplified more and more and more over time.

And so that argument, the argument there is, for broad data sets, to have an awareness that these biases do emerge and be able to find multiple different data sets from lots of different, whether that be populations of humans from different parts of the world, from different perspectives, to try and achieve… To try and minimise the amount of bias that you get. But it probably will still exist.

I think the second part as well is about what you're optimising for and being very aware of the potential externalities of what you're optimising for as well. The fact is a lot of machine learning tools are used because these machine learning programmes are extremely good at optimising, far better than a human would ever be.

But if you're optimising as a social media company for clicks, for example, the potential negative externality of that, which we have seen, is you damage the user experience, but worse than that, you create echo chambers and the spread of fake news.

And so I think it's being very aware that AI does not necessarily lead to wisdom and that we need to ensure that we use as broad a data sets as possible and really try to think through the potential externalities of the decisions that we are making. And that argues to Julia's point earlier that quite a lot of that requires the bottom up considerations from the individuals involved.

MB

Yes. I think that unconscious and conscious bias topic is really fascinating. And in a way, AI feeds off that bias. I don't know if you guys have an Alexa at home, but when you ask the Alexa questions, it's going to probably go to the internet or Wikipedia, pick off the information, then turn it back to us. But that's feeding off information that we've put into the internet in the first place.

So another question that's come in, it seems like China is ahead of much of the world when it comes to big data sources, and these can significantly help to leverage and facilitate the development of AI. Do you agree with this statement?

JA

No, absolutely, in a way. So China has been leapfrogging the developed world in many different ways. So first, that was in e-commerce, when really the level of penetration and sophistication got much further ahead of what we know in the Western world.

But also, of course, given that they have much more looser controls on the data privacy, actually data has been abundant, also given the size of population and number just of interactions in itself just leads to much bigger data sets.

But the companies also have been very, very innovative, the way they use AI. So we've seen actually China being already ahead with that, and I'm not sure where it could stop. Of course, there are attempts to introduce some controls on exports in the semiconductor industry.

But I still think it would be very, very difficult, because when you push some of the really innovative economies to the wall, they will find another way to innovate. Yes, so in general, yes, I agree that data and AI application in China has been really ahead, I think I would say, of what we know within the developed countries.

MB

And this is more of a specific question. It relates to what we were talking about earlier. How far off do we think artificial general intelligence is? Ten years, 100 years or longer?

KG

I think it's probably… Well, they always say that we tend to, what is it, overestimate stuff in the short run and underestimate stuff in the long run. And I think because of this exponential nature of it, I think that it's probably closer than we think, but not a couple of years away.

I think there are a lot of challenges to overcome, as we mentioned earlier, because there's a black box in our own heads as to how things work. I think we can probably move quite quickly towards a far higher level of intelligence than we have today within these AI models. But to reach that real general level of intelligence, probably that final step is probably quite a high hurdle to get over. But I think we can still make really significant progress towards that quite quickly.

JA

So between ten and 100.

KG

Yes.

MB

A broad spectrum.

KG

Yes, a nice, broad spectrum.

MB

And you both spoke a lot about data. How valuable is the data when it comes to AI, and which companies or organisations do you see benefiting from that?

KG

To my point earlier, I think that the data is very valuable. I think you're seeing a broader level of industry change, with the sort of Apple privacy changes that we've seen, that we're moving from a kind of third-party data world to a first-party data world. And companies have not really harnessed the power of their first-party data that effectively previously, or many companies have not. And so I think almost all companies have a very powerful data set that they could potentially harness.

But what is also interesting is that we're seeing… So there's a company listed in the US called Snowflake, and that is basically a cloud date warehousing platform. And what's really interesting about that is they are building strong relationships with their customers, but they are also creating the ability to share data sets. You can decide who has access to your data within that cloud offering.

And even a company like The Trade Desk is also allowing large customers of theirs, like Walmart, are allowing the advertisers to access Walmart data. So not only can you have quite an understanding of who is watching your advert. You're then able to understand whether or not that then led to a purchase based on those too.

So I think it's actually the coming together of that, the multiple data sets, but also the recognition that companies have a lot of data that they've not harnessed previously because they've often relied much more on… We've been in a third-party world, and now we're moving much more into that first-party world.

MB

It probably takes quite a long time for a lot of those companies to realise that. I just wanted to… We're coming to the end of the conference, so I wanted to give you both a minute each to sum up your key thoughts to the viewer. So in no more than a minute, Julia, what would you like to leave the audience with?

JA

So maybe going to one of the first questions you asked, I don't think we should be scared of AI, but we should be cautious. But we should also engage with that. We shouldn't be lazy. And it's to every person. It's not just the companies that are developing, but everyone, because we are actually supplying data to feed AI, and we should know actually what sort of data we're sharing and also have responsibility of it.

But overall, I think it's an extremely exciting area, and what I was also referring to, the light, it's only amplifying the light, because we can start seeing at a much more granular level with the help of AI. And that provides an immense opportunity.

MB

Kirsty?

KG

I think for me, it's about admitting to yourself, we don't really know where artificial intelligence is going. And with all the caveats around its careful handling, I think what we can say is that the opportunity is huge, and it is already transforming industries. And I think there's a lot more transformation that's still to come.

MB

Good to end on that positive note, and thanks to both of you for joining us on IDEAS22, Kirsty and Julia. Thanks very much.

KG

Thanks.

JA

Thank you.

MB

And thanks to you, the audience. I hope you've enjoyed the conversation as much as Kirsty, Julia and I have. And we'd love to hear from you with your feedback. If you do have feedback, we'll be sending you feedback forms over the next couple of days or so, so let us know what you enjoyed and where we could improve.

And just a reminder, if you want to learn more about what's on our investors' minds and what's shaping your portfolios and investments, then check out the Insights page on our website, bailliegifford.com/insights. That's bailliegifford.com/insights. So it's goodbye from Kirsty, Julia and myself, and thanks for investing your time in Baillie Gifford's IDEAS conference.

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