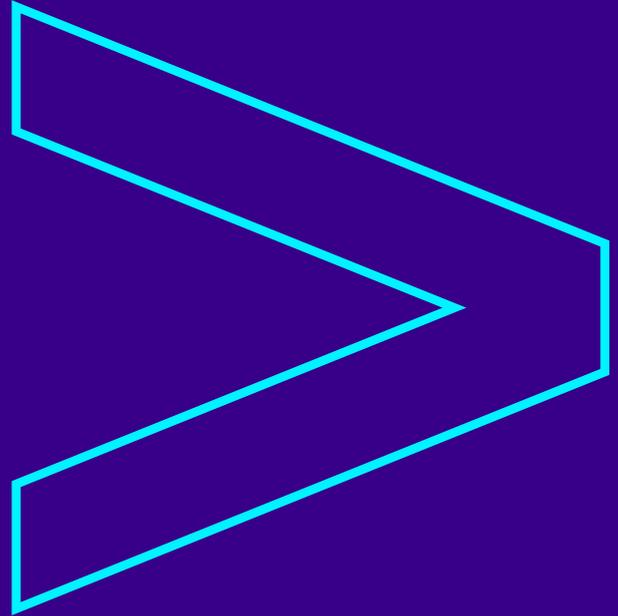THE INTELLIGENT
CAPITAL MARKETS
FIRM

REDEFINE
CAPITAL
MARKETS
with Artificial Intelligence

A TECHNOLOGY REVOLUTION LIKE NO OTHER

Artificial intelligence will enable financial services companies to completely redefine how they work, how they create innovative products and services, and how they transform customer experiences.

Artificial intelligence (AI) is creating the single biggest technology revolution the world has ever seen. The technology – which enables machines to simulate and augment human intelligence – has finally come of age. Across all industries, it's being used to address a wide range of challenges, large and small, by making interactions with machines and systems simple and smart.

Financial services companies, too, are entering the intelligence age. And they're doing so while already under intense pressure on multiple fronts. Rapid advances in AI are coming at a time of widespread technological and digital disruption. Competition is fierce. More than half of Fortune 500 companies have gone out of business since 2000. And AI is set to take this disruption to a new level.

But it's going to bring enormous business value at the same time. Although AI technologies are still evolving, they already have the capacity to enable tangible, real-world business outcomes – today. AI is more than a productivity enhancer – it's a completely new factor of production. And its outcomes can be transformational. By letting machines learn, adapt and improve, AI can bring exceptional value to a business and its customers – and lower costs as it does so.

So, whether it's intelligent automation replacing repetitive manual tasks, workers augmented with enhanced judgement, improved interactions with customers, the development of intelligent products, or the use of responsible AI, the technology will drive enterprise growth, profitability and sustainability across the board.

What's more, AI is set to have a truly positive impact on people. By removing monotonous, repetitive tasks from day-to-day work, it will elevate employees to more rewarding, higher-value roles. It will bring completely new opportunities for the workforce – in the form of new jobs and new skillsets. And it will create technology experiences that are far more closely aligned with personal goals than anything an organisation has been able to deliver to date.

AI EXPLAINER

What is artificial intelligence? Broadly, it refers to the development of machines or systems that can perform complex tasks normally considered to require 'intelligence' and thus thought to be the preserve of humans. Demis Hassabis, CEO of Google Deep Mind, calls it 'the science of making machines smart'. Russell and Norvig describe an intelligent machine as 'a flexible, rational agent that perceives its environment and takes actions that maximize its chance of success at some goal'.[1]

We define it simply as: a computer system that can sense, comprehend, act and learn. In other words, a system that can perceive the world around it, analyse and understand the information it receives, take actions based on that understanding, and improve its own performance by learning from what happened. And by enabling machines to interact more naturally – with their environment, with people and with data – the technology can extend the capabilities of both humans and machines far beyond what each can do on their own.

SENSE
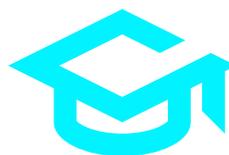**Perceive the world** by acquiring and processing images, sounds and speech.

COMPREHEND
Analyse and understand the information collected by adding **meaning and insights.**

ACT
Take action in the **physical world** based on comprehension and understanding.

LEARN
Improve performance (quality, consistency and accuracy) based on **real-world experiences.**

[1] *Russell, Stuart J.; Norvig, Peter (2003) Artificial Intelligence: A Modern Approach*

While the term 'artificial intelligence' has been in use for decades, the technology's pace of evolution has grown exponentially in recent years. That's because AI doesn't in fact represent a single technology. Rather, it's a multidimensional field encompassing a range of different technologies and methods, each supporting and supported by the others. And it's the multiplier effect of those rapidly evolving underlying technologies – natural language processing, computer vision, machine learning, deep learning, neural networks, and others – powered by huge advances in cloud computing and processing capacity that has brought AI to the fore with such exceptional force.

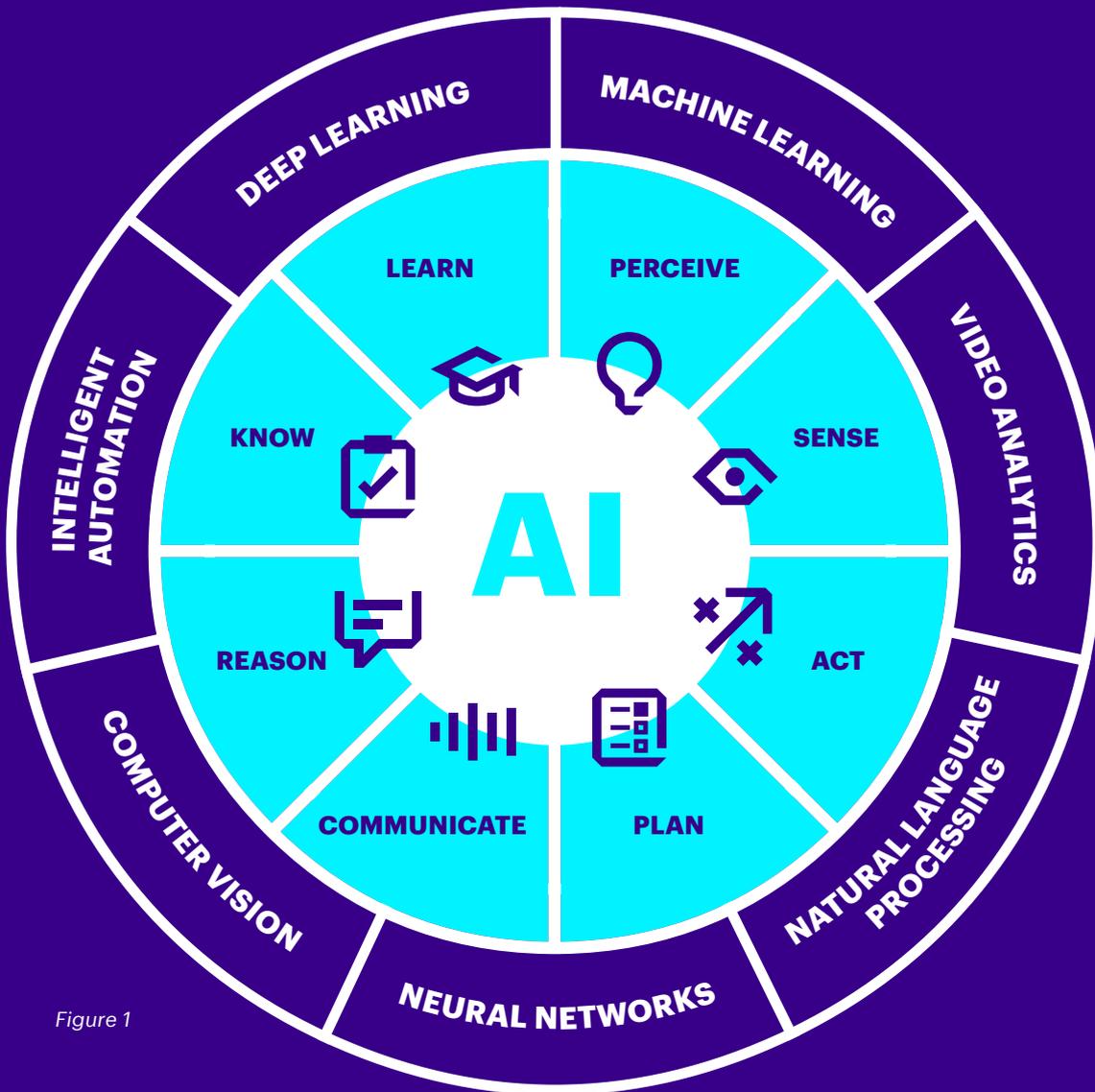# THE TERM 'AI' ENCOMPASSES MANY DIFFERENT TECHNOLOGIES AND CAPABILITIES

Figure 1

[HUMAN x PROCESS x DATA] AI

The capital markets firms that benefit most from AI will be those that are prepared to rethink their approach to their people, their processes and their data.

For capital markets organisations, AI technology is not a new phenomenon. Since the early 1990s, banks have been automating decision-making processes in their trading strategies. More recently, the rise of Big Data and its supporting technologies has enabled them to scale elastically without affecting their balance sheets.

Indeed, the last decade has witnessed explosive growth in new data sources that can impact trading. And some of the most cutting-edge work is being carried out by FinTechs and start-ups hoping to use AI to become the next Google or Facebook of the financial services industry. This is evident in the fact that nearly two-thirds of the finalists in Accenture's FinTech Innovation Lab 2017 leverage AI capabilities to some extent.

INVESTMENT INTO AI TECHNOLOGIES IS SET TO GROW RAPIDLY

Traditional firms are also aggressively pursuing AI capabilities through organic and inorganic means. Goldman Sachs has invested in Kensho (financial analytics using natural language processing)[2] and Persado (AI-based automated marketing and copywriting).[3]

Indeed, most of the top-tier firms operating in investment banking, asset management and wealth management are exploring or piloting AI or machine learning within their organisations. Regulatory bodies and market infrastructure firms are doing the same. They've recognised that AI technologies will augment their human workforces, unlock process efficiencies through intelligent automation and drive value from their vast amounts of data.

Many are approaching AI with a top-down vision and a strategy defined at the C-suite level as they prepare to completely rethink their approach to their people, their processes and their data. Their key challenge is to ensure that the operating model and organisational policies driven by an AI strategy effectively transform the organisation, whilst complying with regulation.

However, in order to fully benefit from AI, capital markets firms must embrace governance and policy changes on an enterprise-wide scale. They must define a set of interventions that meet the needs of the new organisational structure. And they must be prepared to redefine how they work (their processes), what they sell (their products and services) and how they interact with their customers and employees (their user experiences).

How should they best make use of these extraordinary new capabilities? With an intelligent framework that augments their people's work, rethinks how they operate with intelligent automation, and unlocks growth through data.

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[2] *Forbes, 28 Feb 2017 available at https://www.forbes.com/sites/antoinegara/2017/02/28/kensho-sp-500-million-valuation-jpmorgan-morgan-stanley/#49994a515cbf*

[3] *Persado press release, 5 Apr 2016. Available at https://persado.com/press-releases/persado-closes-30-million-series-c-funding-round/*

HUMAN
Transform relationships
Using AI, people will be able to spend more time on exceptional work: the 20% of non-routine tasks that drive 80% of value creation.

PROCESS
Re-imagine business models and processes
Smart machines will continually review end-to-end processes and apply 'intelligent automation of process change' to refine and optimize.

DATA
Illuminate dark data
Companies will apply AI to greatly enhance large data analytics, evolve algorithms with transactional data faster, and combine data in new ways to discover trends.
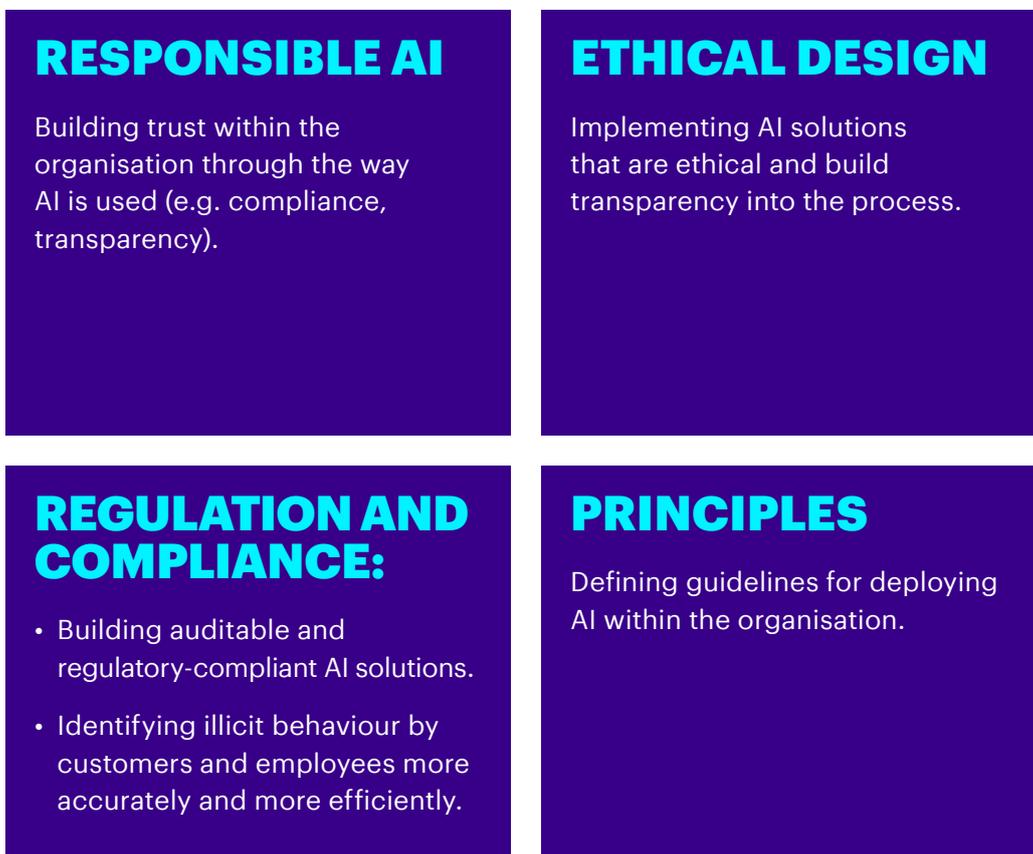
AI IMPLEMENTATION FRAMEWORK

RESPONSIBLE AI

Building trust within the organisation through the way AI is used (e.g. compliance, transparency).

ETHICAL DESIGN

Implementing AI solutions that are ethical and build transparency into the process.

REGULATION AND COMPLIANCE:

- Building auditable and regulatory-compliant AI solutions.

- Identifying illicit behaviour by customers and employees more accurately and more efficiently.

PRINCIPLES

Defining guidelines for deploying AI within the organisation.

Figure 2

HUMANS: AUGMENTING YOUR WORKFORCE

Forget about 'humans versus machines' – AI is about 'humans augmented by machines'.

As AI technology continues to be adopted ever more rapidly, the C-suite faces some key decisions. They must better assess how AI is deployed in their organisations, and measure its impact on the wider workforce. The technology holds huge potential for improving customer and employee experiences, as well as operational efficiency. And capital markets organisations will need to reskill, reorganise and redeploy their resources to better exploit it. Leaders must understand the organisational impact of any implementation, and ensure they have the skills in place today that can evolve to meet the changing demands of tomorrow.

AI is also a key part of the XaaS (Everything-as-a-Service) economy. As such, it can significantly accelerate the speed at which goods and services are delivered to end users – while maintaining quality. For capital markets organisations, this means being able to increase capacity with minimal impact on cost. AI-powered robo-advisors can, for example, create and manage personalised portfolios for individual customers and small businesses without requiring a dedicated (and expensive) relationship manager. Those employees are thus freed to focus on high-net-worth clients or customers requiring special care. This may also allow firms to target clients that would not previously have been profitable to target, thereby helping the firm to expand its customer reach and AUM at a different profit point.

Unlocking the full potential of AI calls for a deep transformation of existing workforces. Humans and AI will need to work closely together. The nature of a job, and the skills needed to do it, will inevitably change. To get this transformation right, organisations must foster the right corporate culture. Employees must understand the technology is a powerful enabler and not a threat to their livelihoods. Responsible and ethical AI practices must be embedded to ensure trust and transparency.

Of course, capital markets firms that make extensive use of AI technologies will also need humans (data scientists, AI developers and others) with the skills to build, use and maintain them. That means attracting some of the best digital talent into what has historically been perceived as a very traditional industry.

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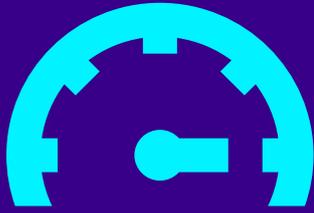
CASE STUDY:
AUTOMATING INVESTMENT DECISIONS

Bridgewater, one of the world's largest hedge fund groups, is running an innovative AI strategy. The fund is using historical data and statistical probabilities to develop trading algorithms capable of evolving with markets over time. Founder Ray Dalio hopes to have his PriOS (Principles Operating System) AI running as much as three-quarters of investment decisions at the firm within five years.[4] The obvious appeal is not just that automated decision making reduces costs, but also that it operates more quickly than a human – and possesses no emotional volatility. That clearly has major implications for fund managers, whose roles will likely have to evolve to functions that only a human is capable of.

[4] *December 2016 interview with The Wall Street Journal*

CASE STUDY:

AN ALGORITHM ON THE BOARD

Deep Knowledge Ventures, a venture capital firm focusing on drugs for age-related diseases, even went as far as appointing an AI algorithm to their board of directors in 2014. The algorithm, known as VITAL (Validating Investment Tool for Advancing Life Sciences), has been approving real investment decisions ever since.

PROCESS: INTELLIGENT AUTOMATION

Traditional automation degrades over time – intelligent automation gets smarter all by itself. It's time to move up the maturity curve.

Advances in AI techniques are already reshaping business processes in capital markets organisations, particularly in the front office. As they do so, the focus is moving away from pure efficiency and cost saving towards redefining processes for AI-enabled organisations. And away from simply automating what happens today, towards a fundamental reimagining of what will be needed tomorrow. Managing this change effectively is essential. As such, organisations must track new trends and technologies, alongside their own capabilities, and be ready to adopt them when they reach a complementary state.

As Robotic Process Automation (RPA) evolves into AI-led intelligent automation, organisations are gaining access to virtual workforces (with pluggable capacities such as voice recognition, generation, etc) that can learn and adapt to the needs of the business. In capital markets, the technology is being extensively piloted from front office where trading, investment research and portfolio/product suggestions are all seeing a large push to automate mundane and repetitive tasks to back office areas such as fraud detection and surveillance.

But this increasing industrial-scale deployment of intelligent automation is just the beginning. Organisations are targeting an end state where only the most bespoke, the most specialised or the most exotic workflows will ever require human intervention.

AI will bring big changes to capital market organisations' IT functions as well. Demand for IT to adapt to change more quickly will keep growing. New technologies will only accelerate the need to decommission legacy systems. Some systems will no longer even have human users as intelligent machines take on the work. Graphical User Interfaces (GUIs) will thus be replaced by interfaces specifically designed for AI agents. Organisations must move rapidly and purposefully to develop policies and protocols to manage these complex systems.

Organisations are targeting an end state where only the most bespoke, the most specialised or the most exotic workflows will ever require human intervention.
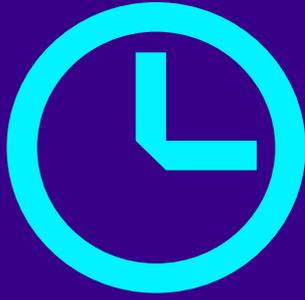
CASE STUDY:

THE ROBO WEALTH MANAGEMENT ADVISOR

A North American bank and brokerage firm uses a robo-adviser to allocate cash among exchange-traded funds according to formulas based on client questionnaires. The adviser maps each investor to at least one of about 40 pre-set portfolios. What's more, its proprietary algorithms are pre-programmed to update portfolios in response to gains and losses by checking relevant markets at set times.

DATA: UNLOCKING GROWTH

Unlocking trapped value will do more than save costs – it will create entirely new products and services for future growth.

The capital markets industry is facing exponential growth in both the structured and the unstructured data available to it. That data holds huge value. But its scale is so vast, it's becoming impossible to analyse with traditional methods. This is where AI can step in and derive actionable insights right across the value chain, e.g. by interrogating and visualising enterprise and customer data in ways that have not previously been attempted or even considered. That's not just opening up new business models in legacy markets, but also redefining entire industries and creating completely new markets.

At its core, AI is about identifying patterns. And the same technology that allows a machine to recognise and interpret voice also allows it to recognise hidden patterns and correlations in data. But any such technology can only be as good as the data sources available to it. And, as the data supply chain evolves, capital markets organisations will need to think outside the box. They'll need to acquire and augment their data in new ways – whether it's from internal or external sources, or in structured or unstructured formats.

Regulators, too, are leveraging data through AI-enabled compliance and surveillance tools. They have been actively engaged with leading industry thinkers and bodies to carve out frameworks to efficiently manage the oncoming change. Indeed, contrary to the widespread view that regulators move more slowly than the firms they oversee, it's possible that regulations might even end up ahead of the industry when it comes to AI.

The FCA is looking closely at supervised machine learning for reporting and compliance, as well as unsupervised AI to detect financial irregularities. It is also examining the potential of the wider RegTech (regulatory technology) sector. And it is working with other global authorities to bring AI further into the regulatory fold.[5]

This approach is evident in the Regulatory Sandbox (or 'RegLab'), an FCA concept which can be used as a safe zone for executing real-world tests of new FinTech products. The tests are executed in a controlled environment but are sufficiently large for regulators to evaluate how the technologies will work in practice. Since the inception of the Sandbox, regulators around the world have launched RegLab initiatives of their own, including Abu Dhabi's ADGM, the Hong Kong Monetary Authority and Singapore's MAS.[6]

AI is about identifying patterns. And the same technology that allows a machine to recognise and interpret voice also allows it to recognise hidden patterns and correlations in data.

[5] *Nick Cook (FCA head of data and information operations) speech to the London FinTech Week 2017 conference*

[6] *ADGM press release, 2 Nov 2016. Available at https://www.adgm.com/mediacentre/press-releases/ adgm-launches-its-fintech-reglab/HKMA FinTech Supervisory Sandbox : http://www.hkma.gov.hk/ eng/key-functions/international-financial-centre/fintech-supervisory-sandbox.shtml*

Monetary Authority of Singapore FinTech Regulatory Sandbox: http://www.mas.gov.sg/Singapore-Financial-Centre/Smart-Financial-Centre/FinTech-Regulatory-Sandbox.aspx

CASE STUDY:

BETTING ON BREXIT

Yoshinori Nomura, who runs a fund trading Japanese TOPIX futures, has described how his Simplex AI machine's decision to bet on Brexit, against its human overseer's better judgement, proved correct and returned 3.4 percent to the fund in a single day. [7]

[7] *August 2016 interview with Bloomberg*

CASE STUDY:
SPOTTING IRREGULAR TRADES

Credit Suisse has embarked on a joint venture with AI firm Palantir to monitor irregular trading behaviour.[8] They're using AI technology to compare the actions of traders to the normal behaviour of their colleagues. They're now able to spot suspicious actions and pre-empt and prevent law-breaking activities.

[8] *Bloomberg article, 22 Mar 2016. Available at https://www.bloomberg.com/news/articles/2016-03-22/ credit-suisse-cia-funded-palantir-build-joint-compliance-firm*

CASE STUDY:

CAN AI ENFORCE FINANCIAL COMPLIANCE?

The Financial Conduct Authority is looking into the possibility of using of AI to enforce regulatory compliance. They're initially looking at the extent to which parts of their handbook can be machine-readable and then fully machine-executable, e.g. effectively converting regulatory reporting rules into truly unambiguous rules that machines can interpret and implement directly, easily coping with the ever-increasing amount of data being shared with the regulator.

EMBRACING INTELLIGENCE

AI represents a technological revolution like no other. Unleashed from the realm of science fiction, this is a real-world technology that is ready to be implemented in any business – today.

And as high-powered computing becomes ever more readily available, and as vast data sets needed for training AI solutions become more accessible, the capabilities will continue to grow exponentially. The world has barely scratched the surface of AI's possibilities.

That creates an imperative for all financial services companies. The time to move on AI is now. Low barriers to entry will bring ever fiercer competition for AI talent, AI patents and AI capabilities. And coming AI advances will be so all-encompassing, and so fast-paced, that high-performing organisations will inevitably accelerate away and leave the slow movers far behind.

Those high performers will use AI to transform the way they organise, run and grow their businesses. They'll implement the technology in innovative ways to reduce cost and create better experiences for customers and employees alike.

But to do so, they'll need to completely rethink how their organisations, and their workforces, operate. They'll need strict guidelines to ensure AI is used responsibly and ethically. And they'll show their employees that AI represents nothing like the threat that some believe it to be. Rather, that it's a means to elevate human working lives to new heights of self-fulfilment.

And, by drawing together the core elements of their people, their processes, and their data, insurers can position themselves to lead their industry as it enters a new era of AI-driven enterprises. Now's the time for insurers to get smart and embrace the transformational power of artificial intelligence.

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