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THE AI REVOLUTION IN FINANCIAL SERVICES

How artificial intelligence is transforming the financial services industry, from portfolio management to AML compliance

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LETTER FROM OUR CEO

When ChatGPT exploded into the public consciousness a year ago, I dropped my head into my hands and wondered: “Is this the end of our business?”

In fact, the result has been exactly the contrary. Our clients and prospects, particularly in the financial sector, have been wary — and I’m understating their concern — over the implications of generative artificial intelligence and its capacity to, well, change everything. They rightly demand that we be extremely careful in its application (as we are, even as we integrate its strengths into our own technology).

It’s not the first time we’ve seen technology upending the financial sector. I remember when ‘fintech’ was almost a dirty word in Luxembourg, eschewed by the mainstream industry, until it became clear that fintech firms threatened their very lifeblood. After that tipping point, if you will, the industry quickly “got religion”, financing, acquiring and creating their own fintech capabilities.

So, too, goes AI, but its implications for all aspects of the industry — not to mention every other aspect of our lives — is far more transformative. I do believe we are on the cusp of change every bit as profound as the Industrial Revolution. As with all new technology, it will take time to develop but its pace will likely be as fast or faster than any other transformation in our lifetimes.

So, following our previous White Paper examining the ripples of ESG and sustainable finance on the financial industry (which — stay tuned — we will soon update for 2024), we’re taking a deep dive into AI and the areas we believe you should be considering in coming months and years because…the revolution is coming fast.

Ask yourself: Will you be ready?

We hope this helps get you there.

Sincerely,

David Schrieberg, CEO

I do believe we are on the cusp of change every bit as profound as the Industrial Revolution.

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AI AND FINANCIAL SERVICES: THE REVOLUTION STARTS HERE

Industry members and analysts are convinced that artificial intelligence will lead to a root-and-branch transformation of the financial services industry, which could bring unimaginable efficiency gains and create a vast range of new personalised products and services. But it could also lead to the mass destruction of jobs while creating new ones and drastically altering others.

Forecasts about the potential economic benefits of AI abound. In April, Goldman Sachs Research forecast that the pervasive use of tools drawing on advances in natural language processing in businesses and society could drive a 7% increase in the size of the world's economy, equivalent to $7 trillion over a 10-year period, and lift productivity growth by 1.5 percentage points.

In the financial industry, according to a study by McKinsey, generative AI could create between $200bn and $340bn of additional value annually for the banking sector, equivalent to a boost of between 9% and 15% in operating profit, through cost efficiencies in areas such as customer service, credit underwriting, risk management and fraud prevention. Its analysts say that in addition to productivity gains, the technology is set to change fundamentally how some jobs are carried out and how customers interact with banks, in some cases leading to entirely new business models.

Some observers take these predictions with more than a pinch of salt. "Strategy consultants love 'crystal ball' maths, but in reality a tenfold increase in market size can come only if we discover fundamentally new and disruptive use cases for applications beyond our current imagination," says Romit Choudhury, founder and chief operating officer of Luxembourg-based Softbrik, whose AI-based solution enables companies to collect and analyse voice feedback from customers and employees.

"As a true visionary, Steve Jobs understood this. In a famous interview after the launch of the first iPhone in 2007, he said we need to understand that not only the innovator innovates but consumers, too. People are constantly inventing things, not just technologies but also use cases."

Choudhury notes that Moore's Law, the observation that the number

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of transistors in an integrated circuit doubles roughly every two years, led not only to the emergence of the digital world "but also application-layer innovation such as remote work and driverless cars that would have been impossible to imagine few decades ago. On the other hand, crypto-currencies have not lived up to the initial hype due to a lack of use case imagination. So unless we discover disruptive new use cases, business as usual will give us acceleration but not fundamentally reshape the world."

At the beginning of the innovation curve

Olivier Carré, deputy managing partner and technology and transformation leader in the country leadership team at PwC Luxembourg, acknowledges that predictions about the impact of new technologies, whether in terms of GDP growth or more general implications for the economy and human welfare, are always difficult to assess. "With GenAI in particular, we are at the very beginning of the innovation curve and the commercial use of this technology," he says.

"What we can observe at this stage are three main factors that could propel an impact on GDP at the level predicted or even well beyond: speed of adaptation, number of use cases, and scalability. Each of these factors is important for the success of any venture, whether business or technology. But we are very optimistic about the benefits of GenAI in transforming business value chains and processes."

Nasir Zubairi, CEO of the Luxembourg House of Financial Technology, says: "The projections are certainly ambitious, but they're not without merit. AI's potential to revolutionise industries, including finance, is vast. However, it's essential to approach such forecasts with a blend of optimism and caution. While AI can drive significant efficiencies in areas such as customer service and risk management, the actual value unlocked will depend on how seamlessly these technologies are integrated, and the regulatory landscape they operate within."

In any case, the AI-driven future looks less rosy and more complicated for employees. A much-noticed survey by UK-based software firm FintechOS found that 73% of financial sector executives expect their jobs eventually to be carried out by generative AI; respondents were evenly split on whether AI was a net positive for the industry. However, beneficial or not, the trend appears unstoppable – half the executives questioned said their businesses were already investing in generative AI and large language models.

That conclusion was echoed by EY's *2023 European Financial Services AI Survey* of 60 financial services businesses, in which almost 60% of respondents said their institution had invested actively in generative AI over the previous six to 12 months, while 75% were

planning to increase spending over the next year. EY concludes that most European financial executives expect generative AI to disrupt working practices, with more than 80% of respondents saying they anticipate up to a quarter of all roles to require upskilling over the next year, with entry-level positions particularly affected.

A survey published in December by Geneva-based banking software provider Temenos found that 75% of bank executives polled believe their industry will be significantly impacted by generative AI and that more than 70% say unlocking value from AI will be a key differentiator for banks' future growth. The study also reports that around 30% of jobs currently advertised in the European banking sector mention AI, highlighting the vigorous demand for expertise in the industry and pointing to a likely skills gap as institutions increasingly adopt the technology.

Where is AI already having an impact?

Well before the current surge of interest in applications of generative AI, financial institutions were already employing related technologies in a range of areas. In lending, for example, machine learning and pattern recognition provide greater insight than credit scores and histories in assessing the creditworthiness of borrowers applying for credit cards or classic loans. The aim is to lower the risk of default, while reducing the time and human effort required to process applications – and it may, in fact, lead to higher rates of credit acceptance.

While machine learning is also becoming a key tool for fraud detection in lending, it extends throughout financial institutions' activities by its ability to sift vast amounts of transaction data to detect unusual patterns that may indicate suspicious activity and possibly fraudulent transactions, including questionable online log-ins or signs of identity theft.

The insurance industry is employing AI in the critical financial modelling required to calculate risk as accurately as possible in order to determine the price of coverage. It also plays a key role, as in banking, in the detection and prevention of fraud, a particularly important problem for the insurance industry, as well as in the management and settlement of customer claims by using algorithms to speed up notoriously slow processes.

The flip side of the risk of fraud or exposure to other financial crime is the huge effort that financial institutions are increasingly required to make to verify the identity and source of funds of their customers and ongoing checks to determine that transactions do not appear to involve money laundering or funds related to terrorism.

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AI tools can lift much of the burden of the "document collection" aspects of know-your-customer due diligence and AML controls, such as making checks against lists of individuals or entities on financial crime or economic sanctions blacklists. They can also, for example, resolve the issue common a few years ago of European banks refusing or removing customers with links to the United States because of their reluctance to accept the time, effort and cost required by compliance with the US Foreign Account Tax Compliance Act.

Institutions throughout the various branches of the financial services industry have been using AI to make customer service more responsive and effective, a particular concern in banking among retail customers and especially for wealthy clients, in a market where switching providers is much easier and more prevalent than a few decades ago. Beyond handling routine queries, both text-based and with voice recognition, chatbots are increasingly called on to open accounts and handle credit requests, or as a marketing tool in areas such as making product recommendations.

In the investment industry, AI systems are being used to provide personalised trading and portfolio optimisation recommendations to individual investors based on their background, history and preferences, as well as for asset managers to assist with the financial analysis and risk management functions underpinning asset allocation and stock selection decisions. They can also facilitate the rapid execution of trades for both retail and professional investors.

AI-focused initiatives in financial services worldwide

The past six months have seen a wave of announcements by financial groups worldwide that they are incorporating AI into different aspects of their operations, particularly in development of chatbots to serve staff or customers, to extract data from or process financial and regulatory documents, and to organise customer data:

- Singapore's OCBC Bank has deployed a generative AI chatbot for use by its entire workforce of 30,000 employees in 19 countries. Developed with Microsoft Azure, the bot will help employees at the bank's branches and offices with research and writing, as well as answering queries; trials have already reduced the time required for tasks by half.

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- Morgan Stanley's wealth management business has launched a generative AI bot developed by ChatGPT creator OpenAI following several months of testing with 1,000 financial advisers. The virtual assistant will listen to conversations, help advisers find research data or forms and eventually create summaries of conversations, draft follow-up e-mails, update the sales database, schedule appointments and help advisers manage customers' finances.

- Australian bank Westpac has partnered with Sydney AI firm Rich Data Corporation to streamline business lending decisions with technology incorporating analytical and predictive data functions, enabling it to introduce a digital application process for loans and provide an expanded cash flow offering that gives companies access to flexible unsecured funding.

- Deutsche Bank's Corporate Venture Capital group has invested in Kodex AI, a Berlin-based start-up developing a generative AI platform tailored to the needs of the financial industry. The start-up's founders have already worked with the bank's developers on a generative AI-based system to extract and process data from financial documents.

- Britain's NatWest has expanded its partnership with Amazon Web Services to offer customers generative AI-based support for its products and services, aiming to help 10 million customers manage their financial wellbeing by the end of 2027, including through ethical and responsible AI products that can answer customer questions and help them set financial goals.

- HSBC has launched AI Markets, a service harnessing natural language processing and generative AI to produce bespoke market analytics, offered to institutional investors and companies through HSBC's Evolve trade execution platform or directly through an API. The tool can process real-time and historical financial data as well as market news and insights.

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- Italian bank Intesa Sanpaolo has launched an AI tool developed in-house to process thousands of publications on banking supervision. The Lisa – Linguistic Intelligence for Supervisory Awareness – machine learning software uses language processing algorithms to analyse documents for patterns and correlations that could help predict future financial trends.

- The Nasdaq stock market has launched an AI-driven order type, the dynamic midpoint extended life order, designed to speed up order-matching and minimise market price impact, leading to better trading outcomes for investors. Nasdaq says the new order type has increased fill rates by 20.3% and reduced mark-outs by 11.4%.

- Temenos has unveiled a generative AI tool to classify customer banking transactions automatically, enabling clients to provide their own customers with personalised insights and recommendations and offering a high degree of accuracy in multiple languages.

- Researchers at London's University College and Queen Mary University have developed an AI-powered tool to help governments determine whether a bank should be bailed out during an economic or financial crisis. The algorithm, tested using data from the European Banking Authority on 35 significant financial institutions, forecasts whether a bail-out would save taxpayers' money over the long term, analyses how much should be invested in a particular institution, and provides recommendations on which banks should be bailed out at any particular time.

SEC chairman and other sceptics

But there are sceptics, too. Among the most prominent is Gary Gensler, chairman of the US Securities and Exchange Commission, who has warned financial businesses against making false claims about their use of artificial intelligence capabilities, saying that such untruthful disclosures are on a par with greenwashing. The US Federal Trade Commission has also warned it will be on the alert for bogus claims about use of AI.

Gensler is also concerned about the risk of AI increasing the prevalence of herd behaviour in financial markets. He has warned it is virtually certain that AI will precipitate a financial crisis within a decade unless regulators act quickly to establish rules for managing concentration risk.

the financial industry – although the issue is complicated by the country's dearth of IT specialists.

At the ALFI Private Assets Conference in November, Allianz Capital Partners director Helge Baur said that while AI is likely to make administrative tasks such as minute-taking and communications more efficient, the main challenge is to improve decision-making, with investment specialists seeking to incorporate AI functions into their financial analytics.

AI is expected to play a major part in the process of consolidation and rationalisation in the field of fund and asset servicing, noted Alan Dundon, president of industry group L3A, the Luxembourg Alternative Administrators Association. It can also help to address issues such as wide variations in data collection practices in the private markets sector, although Cara Browne, head of relationship management and product oversight at EQT Fund Management, noted that while efficiency gains are clear in areas such as corporate secretarial functions, quality checking remains an important challenge.

The capabilities of AI in an area involving large volumes of text, such as screening of legal documents, are already evident. Baur says that while its use in decision-making raises a range of regulatory and ethical issues, in processing of documentation the technology can simultaneously provide far greater efficiency, along with improved quality.

Ananda Kautz, head of innovation, payments and digital at the Luxembourg Bankers' Association, says: "What is clear is that the vector of AI-driven innovation will surely be upward while bringing cost efficiencies in many areas, not only limited to customer service, credit underwriting, risk management and fraud prevention. We currently see growing interest from financial institutions toward AI in general and generative AI in particular, and the pace of experimentation with the technology and its adoption will accelerate."

A survey conducted by the Luxembourg Central Bank and financial regulator CSSF between October 2021 and January 2022 identified no fewer than 158 different use cases of AI technology in the country's financial sector. Another study conducted by the ABBL in co-operation with Société Générale this year found that 76% of respondents consider tools such as ChatGPT an opportunity for their businesses rather than a threat. Says Kautz: "According to respondents, potential benefits of ChatGPT include cost and time efficiency, processing power, higher productivity and better client service."

Noting that AI models are being created by technology companies not subject to oversight by financial regulators, Gensler argues that the risks exist across different financial markets; while the SEC and other supervisory authorities traditionally focus on the conduct of individual institutions, he says, the danger posed by AI is that many institutions will use a common base model or underlying data aggregator.

Financial regulators are already examining use of AI technology by institutions in areas that might give rise to concern. The SEC's examinations division has launched an enquiry into the use by investment advisers of artificial intelligence in marketing and management.

The Bank of England is also conducting a review of the use of AI and machine learning in financial services to determine whether they could pose a risk to financial stability. Noting that recent breakthroughs in generative AI have prompted institutions to explore new use cases, like the SEC the UK central bank also fears the technology could amplify herding or pro-cyclical behaviour.

Meanwhile, Britain's National Cyber Security Centre has warned organisations about the potential dangers of integrating artificial intelligence-powered chatbots into their operations, reporting that research has increasingly found that bots can be tricked into performing harmful acts.

The agency says examples include evidence that an AI-powered chatbot deployed by a bank might be guided into making an unauthorised transaction if a wrongdoer structured their query in a particular way. It advises organisations not to rush to grant AI systems the ability to execute transactions on behalf of customers.

Meanwhile, in Luxembourg...

A report in October 2022 by the UK's Financial Services Authority and the Bank of England found that 72% of financial services firms surveyed were already using machine learning applications, a number they expected to grow three-and-a-half times over the next three years, led by the insurance industry and followed by banking. Respondents also reported that nearly four-fifths of applications were in latter stages of development – either deployed across a wide range of business areas or critical to some of them – and that a similar proportion have a strategy for the development, deployment, monitoring and use of machine learning technology.

Enthusiasm for the efficiency gains offered by AI is equally evident in Luxembourg, where the technology appears to offer at least some help in addressing with the acute shortage of skills in key areas for

LHoFT's Zubairi argues that the extent to which AI fulfils its potential will depend to a considerable degree on the rules under which it operates. "My concern is that AI regulation will be overbearing, drawn up without employing experts from the field," he says. "We may end up with a rocket ship capable of interstellar travel, but our concern about risk will limit it to taking tourists between Luxembourg and Mallorca at the speed of a snail. Of course we need to address concern about biases and ethics, but let's be real – I worry more about the biases and ethics of people than I do about ChatGPT."

— Simon Gray, Editor-in-Chief

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INVESTMENT MANAGERS FACING UP TO AI: FRIEND OR FOE?

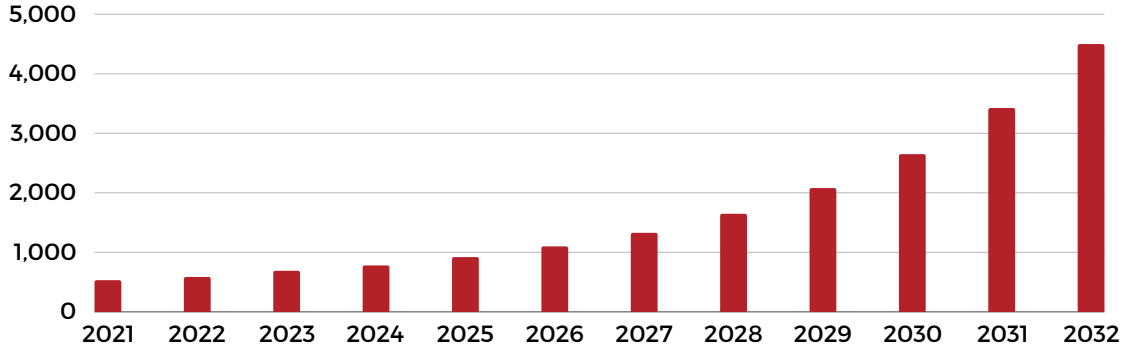
Armed with plausible statistical evidence, active investment managers have been trying for years to fight off the argument that most investors would be better served by products that mechanically track financial market indices. Now they face a fresh assault on their livelihood from a growing belief that machines can better perform their job of sifting data, trends and sentiment that will shape the future movement of securities markets and individual stocks.

The emergence of AI models with superior learning capabilities than existing tools raises a range of questions for the asset management industry, some of them existential. Can AI improve financial predictions for both asset managers and individual investors? Will this lead to disintermediation across the financial services value chain and improve the cost-efficiency of the investment process? Will it contribute to the much-touted democratisation of the investment industry by enabling customers large and small to fine-tune their risk tolerance and long-term goals more easily and at lower cost?

Currently, these remain largely questions without answers, although there are already some signs in the air. A handful of studies have already posited that AI can outperform human investment specialists much or most of the time, with lesser or greater persuasiveness. While the evidence is still thin, it may not remain so for long.

Earlier this year, UK personal finance site Finder created a theoretical investment strategy managed by OpenAI's ChatGPT model, following investment principles from leading asset managers. The firm reported that the strategy outperformed Britain's 10 most popular funds on 34 market days out of 37 – by as much as 6.6 percentage points on April 4, when the AI fund reported a gain of 4.7% while the real ones declined on average by 1.9%. The ChatGPT fund invested in 38 stocks and benefited from gains over eight weeks in the value of Facebook owner Meta (up 30%), Microsoft (20%) and Intel (nearly 18%).

AI in asset management market size in the US, 2021-2032 (in USD million)



Source: Global Market Insights

Technology's long history as an investment tool

In November, an academic specialist in quantitative finance, ETH Zurich professor Erich Walter Farkas, reported that wealth management portfolios managed using AI technology systematically outperformed those run by Swiss banks according to traditional portfolio management approaches — not necessarily music to the ears of his audience at the time, the annual congress of the Swiss Association of Wealth Managers.

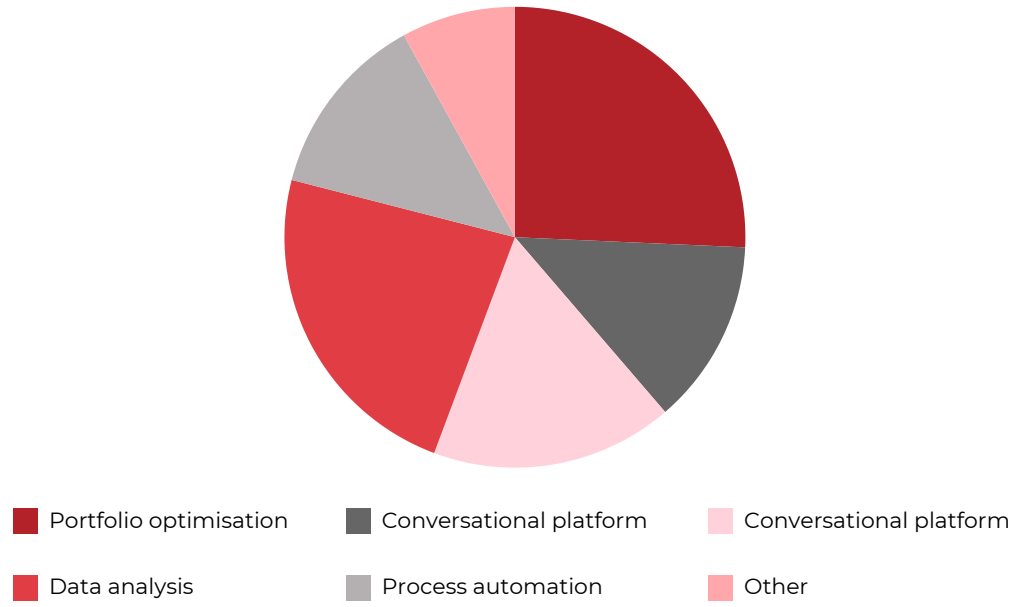
It's still far too soon to assume that humans have no long-term future in the portfolio management business. But such studies, if they are widely replicated, suggest that AI-assisted tools in future will play a significantly larger role in the investment process. That said, it's increasingly clear that human judgement is no longer the only game in town.

In fact, in certain areas, this has already been the case for years, even decades, notes LHoFT CEO Nasir Zubairi. "Quantitative hedge funds have utilised machine learning and artificial intelligence for trading decisions for several decades," he says. "Automated, algorithm-based execution accounts for more than 50% of liquidity on major markets such as the New York Stock Exchange and the Chicago Mercantile Exchange. Bank trading desks have become increasingly automated over the past 20 years. I helped set up and run an automated high-frequency trading desk at a bank in London in the mid-2000s."

Nevertheless, the mythical figure of the star fund manager with impeccable and inimitable market knowledge and wisdom has persisted until now. But Zubairi says: "Finally, the broader investment fund industry is slowly waking up.

"AI has the potential to become a game-changer for the investment community and drive democratisation of the industry, making sophisticated tools available to more people and enabling more personalised risk management. By analysing vast amounts of data at unprecedented speeds, AI can offer insights at unparalleled scale."

Global AI in asset management market share, by application, 2022



Source: Global Market Insights

Balancing efficiency gains with human insights

As elsewhere in the financial industry, he believes, the biggest challenge will be in balancing the huge efficiency gains possible with the aspects of investment management that machines cannot – yet – master. Says Zubairi: “For asset managers and individual investors, these developments mean more accurate forecasts, better tailored investment strategies and better overall investment decision-making.

“However, as has been the case in sell-side dealing rooms, with increased automation comes a level of disintermediation. AI will drive cost efficiencies, but it's crucial to ensure that the human touch, which understands the nuances of client relationships and ethical considerations, isn't lost.”

PwC’s Olivier Carré also underlines that technology has long been used by the asset management industry to predict markets and guide management of investment portfolios – but also sees the potential pitfalls. He says: “The supporting technology, such as asset allocation algorithms, has enabled models up to full benchmark-driven passive investment solutions.

“GenAI will certainly add to the sophistication and efficiency of such predictive processes in portfolio management and investment advice. But we should never forget that a major part of the markets is driven by perception, subjectivity and moods – like Mr. Market”, the often-irrational allegorical character invented by Benjamin Graham, revered as the father of value investing, in his book *The Intelligent Investor*.

“We see limitations in the investment performance and cost efficiency driven by generative AI,” Carré says. “Markets will be impacted by this new technology, and we need to manage the risks, such as trading speed drops or the systemic risk of machines all doing the same transactions at the same time. Human beings remain essential, because they are best placed to understand non-rational and subjective moods in markets or regarding an individual company or investment.”

Making meaning out of numbers

SoftBrik’s Romit Choudhury acknowledges that applied AI tools will improve process efficiencies and lower costs in areas such as anti-money laundering and know-your-customer checks, risk management and customer service. But, he says, “none of these examples is a game-changer. My hypothesis is that the true value of artificial intelligence will be in context extraction. Financial decisions are mostly about making meaning out of numbers, and this is where AI can make a difference.”

AI has the potential to become a game-changer for the investment community and drive democratisation of the industry, making sophisticated tools available to more people and enabling more personalised risk management. By analysing vast amounts of data at unprecedented speeds, AI can offer insights at unparalleled scale.”

- Nasir Zubairi,
Luxembourg House of Financial Technology

He offers the example of a bank considering applications for a loan from two people, each with €100 on deposit. One grew up in a single-parent household, paid their way through college and recently was promoted in their job; the other has just €100 left from a family inheritance, although they do own an apartment.

Says Choudhury: “Current bank KYC models would identify the second person as the safer bet. However, any venture capitalist, investor or recruiter would choose the first applicant because they clearly have demonstrated greater drive and potential, which we know is often the swing factor in creating wealth in the future. AI tools can launch understanding of that now.”

He’s less certain that AI can be a force for democratisation of investment services. “Democratise is an all-encompassing word and it is hard to know whether access to banking and other financial services will be broadened as a result,” Choudhury says. “I don’t see AI tools bringing much increase in risk tolerance because it is much more rooted in human psychology and the habits of decision-makers than the algorithms that can help them take decisions.”

A SILVER BULLET FOR THE KYC/AML ROADBLOCK?

Artificial intelligence is likely to have widespread applications for detecting and preventing financial crime. And for the financial services industry, it could well be a vital tool in helping to verify that potential customers are not, in fact, criminals.

Speaking at ALFI's Private Assets Conference in November, CSSF head of fund supervision Marco Zwick noted that in 2021, 85,822 of the 1.03 million investors in Luxembourg-domiciled investment funds – 8.34% – had seen their accounts blocked because of due diligence issues. He observed that most cases did not involve suspicion of money laundering or other crimes but, rather, deficiencies in the due diligence process.

Initiatives to harness technology that can accelerate know-your-customer verification and anti-money laundering due diligence have been underway for many years, notably by automating the checking of customers' names against blacklists for financial crime and sanctions. But optimism abounds that new advances in AI can take this process much further.

The central question is the extent to which AI systems can speed up due diligence and KYC processes, striking the right balance by conducting checks more efficiently without either throwing up false red flags or ignoring evidence of possible financial crime – both of which current, more-or-less automated systems are blamed for doing.

"To understand the benefits of generative AI on due diligence and KYC processes, we need to first understand the challenges in today's set-up," says PwC's Olivier Carré. "In financial services, one of the main challenges remains data ingestion and data standardisation, and alignment prior to the actual business process, particularly for complex data assessment processes.

"Another challenge is the interpretation of free text, unstructured data and multiple data points. We have been working for many years with our clients on risk-based models and optimisation of data collection and assessment in due diligence or KYC settings. GenAI has the ability to conduct intelligent data ingestion, and thus to identify gaps, inconsistencies and early warnings."

Human-led but technology-enabled

He also argues that generative AI can support more complex risk-based assessment of the data sets received: "This is predicted to reduce significantly data breaks and false hits and allow first-level conclusions." But Carré cautions AI can only take the process so far. "Based on our experience in complex cases, no technology can replace the professional judgement of a trained human being," he says. "A human-led but technology-enabled process is our view of the AI-powered future."

Icelandic fintech firm Lucinity, which uses AI to support the efforts of bank staff to detect money laundering and other illegal activity, is an example of the technology being used as a

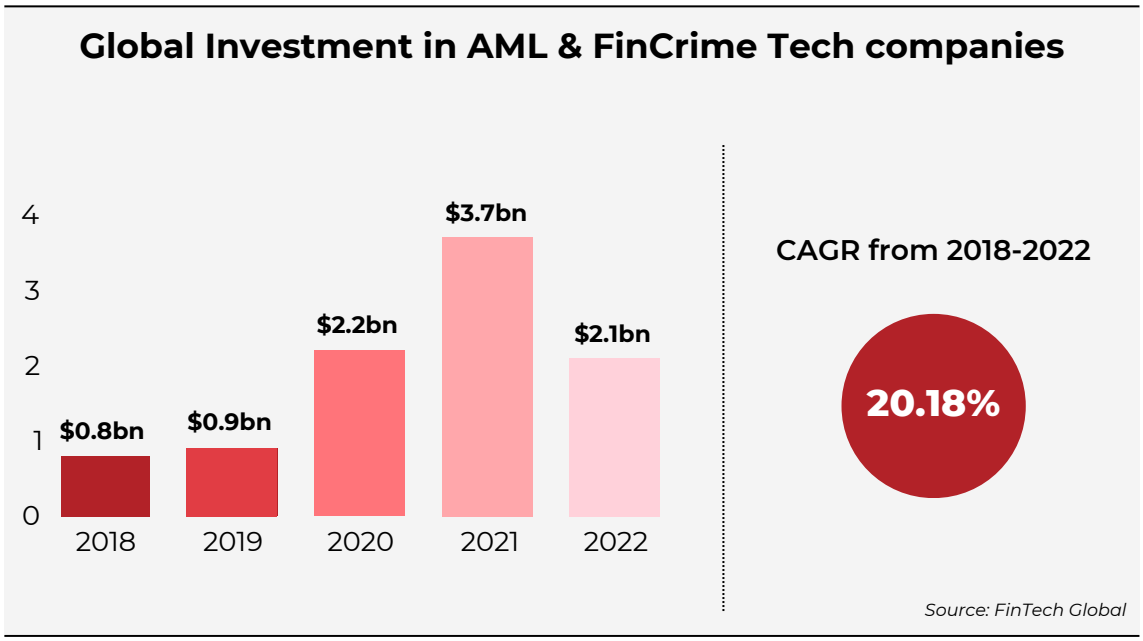
tool to assist human expertise rather than in a self-driven system.

The firm's system, Luci, turns alerts about transactions and individuals into text, enabling human agents to assess them more quickly, and can write summaries, enabling staff to work through their caseload more quickly. "It's all about saving minutes, which leads to hours," says founder and CEO Gudmundur Kristjansson.

But there is also some concern that AI might make due diligence process more difficult rather than easier. It could impact KYC processes, according to UBS analysts Annabel Willder, Victoria Kalb and Julie Hudson, by facilitating the publication of false information. They point out that so-called deepfake inventions are becoming harder to detect, and say AI can also be used to manipulate sanctions lists easily, so banks should be wary of relying on it to perform KYC processes and anti-money laundering checks.

The ABBL's Ananda Kautz notes that the term covers a wide range of technologies and approaches. "Components and tools of AI systems are diverse in the degree of complexity and effectiveness of AI methods and models," she says.

"Traditional rule-based systems that have been used so far in many automated decision-making solutions are currently being replaced by more sophisticated methods such as machine learning, neural networks and deep learning. These technologies are able to solve more complex problems in a faster, precise, and non-linear way."



Dangers of bias and hallucination

Kautz acknowledges that widespread experimentation with AI models has uncovered their limitations and drawbacks, including biased and incorrect responses to queries and a propensity to 'hallucinate' completely imaginary data. Earlier this year a US federal judge imposed $5,000 fines on two lawyers and their firm, Levidow, Levidow & Oberman, after it emerged that ChatGPT had generated fictitious legal research submitted in an aviation injury claim.

The generative AI system invented a series of precedents, including cases entitled Martinez v. Delta Air Lines, Zicherman v. Korean Air Lines and Varghese v. China Southern Airlines, and when challenged by one of the lawyers, asserted that the decisions could be found in the widely-used Westlaw and LexisNexis databases.

"Further research and development in this field, coupled with a responsible, compliant, ethical and trustworthy application of novel AI systems, will increase the value and power of AI tools for market actors for many use cases, including for KYC/AML," Kautz says.

> ***In financial services, one of the main challenges remains data ingestion and data standardisation, and alignment prior to the actual business process, particularly true for complex data assessment processes.***
>
> - Olivier Carré
> PwC Luxembourg

She notes that in 2021, the ABBL, its Foundation for Financial Education and the University of Luxembourg's Interdisciplinary Centre for Security, Reliability and Trust launched a joint research project — Trustworthy AI for Instant AML Due Diligence — to explore the applicability of artificial intelligence systems to money laundering controls.

The initiative is expressly aimed at developing tools to resolve possible flaws in the reliability of artificial intelligence in the banking sector and to provide solutions for instant monitoring of payments, focusing on the transaction monitoring phase of AML due diligence to reduce false positives. The project is building a common robust AI model with several institutions without exchanging data by using the federated learning approach.

WHEN FINANCIAL REGULATORS EMBRACE AI

Members of the financial industry are convinced of the potential of artificial intelligence to transform broad sections of their activities. At the same time, regulators also see opportunities to harness the technology to supervise the sector more efficiently and effectively.

Much of the interest in current and prospective uses of artificial intelligence in the financial services industry focuses on how institutions can automate functions that currently rely on human beings — and perhaps on how to do them better, for instance in investment management. Monitoring this and assessing the risks, especially but not solely to retail customers, will present a new challenge to the industry's regulators.

In the meantime, however, financial regulators are themselves examining how AI can facilitate and improve their own work — and also how it could smooth the more functional forms of interaction with industry members, such as the routine reporting of data and submission and checking of standardised documents.

Claude Marx, Director General of Luxembourg's financial regulator CSSF, says: "One of the first use cases we see for AI is to verify compliance with the law of prospectuses for UCITS and other large regulatory documents. This would enable CSSF agents to focus on higher added-value tasks. Another use case could be verification of documentation certifying that industry members are fit and proper."

He also sees AI playing an increasingly important role in facilitating compliance processes at financial institutions, which complain about the steadily growing burden in human resources and cost. Says Marx: "For regulated entities, AI could be used as part of customer data verification and acceptance against the company's risk appetite and regulatory provisions, public and private databases and sanctions lists."

Compliance versus mis-selling

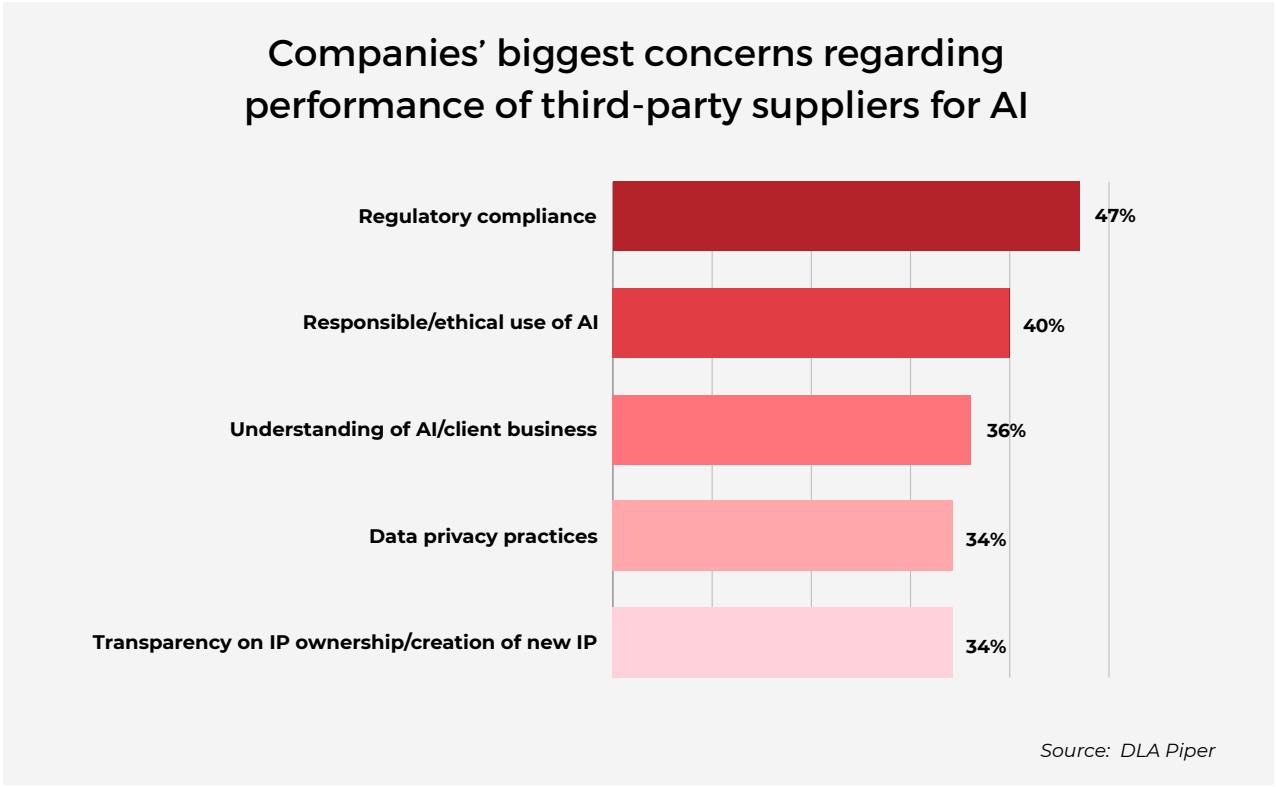
He acknowledges that the technology is a double-edged sword for the financial sector, capable not just of automating regulatory compliance but facilitating mis-selling of financial products and services. "The challenge will be to understand algorithms and continue to ensure that financial products such as those selected through robo-advisory services are in line with the client's knowledge and experience, time horizon, risk appetite and understanding, and investment preferences."

Marx says initiatives are underway, overseen by the European Central Bank and the European Supervisory Authorities, regarding the use of AI-powered tools and training for supervisors in their oversight functions and efforts to curb fraud, mis-selling and other infractions.

Regarding monitoring the use of AI technology by companies outside the jurisdiction of the Luxembourg and EU authorities, he says: "This is no different from outsourcing within financial groups and to third-party providers and will be covered through EU regulation and CSSF guidelines on outsourcing."

Still, the question remains open as to whether financial institutions and legal and regulatory authorities can move faster to exploit AI to curb fraud, money laundering and other financial crime than wrongdoers' harnessing of the technology to deceive companies, financial institutions or members of the public, for example through extremely convincing impersonation of trusted or official entities.

"It's a bit like a game of chess," says Nasir Zubairi, CEO of the Luxembourg House of Financial Technology Foundation. "Both sides are constantly evolving, learning from each other's moves, and adapting their strategies. Financial institutions have the advantage of resources and collaboration. If they pool data and share insights, they can create more robust AI systems to detect anomalies and patterns, for example, of fraud and money laundering."



Inherent asymmetry

These approaches already exist, Zubairi notes. "When I set up my first start-up [EuroTRX, the European Trade Receivables Exchange], I built a machine-learning model for detecting fraudulent invoices, leveraging concepts in behavioural science. It was not particularly difficult to find patterns of abuse as a result of heuristic biases that are ubiquitous."

Zubairi adds: "Regulatory bodies obviously play a crucial role in setting standards and ensuring that financial institutions are not only protecting their assets but also their customers. On the other hand, criminals are nimble, often operating in decentralised networks, and can quickly adapt to new detection methods. Their use of AI can be extremely sophisticated.

There's an inherent asymmetry to this game that is akin to the lucky amateur chess player catching a grandmaster off-guard. While financial institutions need to be right every time, wrongdoers only need to be successful once. This makes the task of the institutions incredibly challenging."

He argues that it's essential for institutions and regulatory bodies not just to react to new techniques in financial crime but to anticipate them: "This involves investing in research to understand the evolving tactics of criminals, fostering a culture of continuous learning and training, and collaborating across borders and sectors."

This will require industry members comprehensively to re-examine their culture, Zubairi believes. "They need to think about how to create an environment and a package to attract the best data scientists and security resources to keep an edge in the battle," he says. "By its nature, financial crime is global and sophisticated; the strategies to defeat it must be wide-reaching and even more intelligent."

From financial advice to payment systems

Meanwhile, regulators and other financial officials are exploring a range of ways in which AI could improve the functioning of service provision and outcomes for customers, as well as in policy-making. In the UK, the Financial Conduct Authority is examining its potential role in the market for financial advice, a highly problematic area fraught by long-standing controversies on how to preserve the independence and integrity of advice — and how it should be paid for.

The regulator's chief information officer, Jessica Rusu, says AI could help close the UK's advice gap – stemming from the unwillingness of many individuals to pay sizeable fees to financial advisers, whether calculated by the hour or as a proportion of assets subject to advice. She argues that the technology could transform personal financial services by delivering better outcomes for customers, with use of large language models helping to provide investors with more accurate information.

Rusu does, however, acknowledge that AI also carries risks; the FCA already uses it to help tackle fraud and identify wrongdoers. The regulator's CEO, Nikhil Rathi has warned banks about the risk of deepfake fraud generated through the technology and urged them to boost spending to prevent AI-related wrongdoing. Rathi has reminded bank executives that they may be held responsible for decisions taken by AI bots at their institutions. The ability of AI to mimic personal finance experts in order to market speculative investments calls for greater investment in fraud prevention and operational resilience, he says.

The Reserve Bank of India is focusing on the role the technology can play in making national payment systems faster and more efficient. The central bank and banking industry regulator has unveiled an AI-powered instant conversational payment system in its efforts to bring greater digitalisation to the country's banking processes. The new capabilities will be added to India's Unified Payments Interface, enabling users to engage a chatbot to conduct transactions, and will be accessible through smartphone-based UPI channels in both Hindi and English.

Banks, especially in Europe, tend to have complex, outdated and fragmented datasets on which building today's AI models is impossible...Without data there is simply no effective AI.

- Romit Choudhury, SoftBrik

Meanwhile the European Central Bank is examining how AI might help it process information on both markets and financial institutions, including public price data, corporate statistics, news articles and bank supervisory documents, to support analysis underpinning monetary and regulatory policy decisions. The ECB says machine learning already enables it to automate the classification of data, freeing staff to focus on assessment and interpretation. The institution is also working with eurozone national central banks to explore how AI can help improve understanding of price-setting behaviour and inflation dynamics in the EU.

Conformity assessment

SoftBrik's Romit Choudhury says the response of institutions and supervisors must encompass three critical components: data, regulation and trust. "Banks, especially in Europe, tend to have complex, outdated and fragmented datasets on which building today's AI models is impossible," he notes. "This is one of the key reasons why we at SoftBrik are leading a conversation about creating meta-data lakes for artificial intelligence. Without data there is simply no effective AI."

Emphasising that the banking industry is already highly regulated, Choudhury insists that new AI tools will require conformity assessments that institutions need to be planning for soon. "The EU's AI Act seeks to create mechanisms for faster adoption of AI tools with principles of safety and anti-discrimination in mind by introducing conformity assessment mechanisms and sandbox testing for algorithms," he says. "However, it is broad and we need to see how the banking and financial services industry interprets it for implementation."

He also identifies issues with both the industry and the technology that will influence how it is adopted. "Banking is conservative and characterised by slow decision-making cycles, which doesn't make it particularly attractive for AI companies to target initially," Choudhury says.

"In the banking and financial services space, they will potentially first target fintech, and especially payment technology companies. Also, most applied AI models today lack 100% precision, with false positive cases which make them easier to use for customer intelligence and load balancing but less so for mathematical transactions."

CAN AI HELP CLOSE LUXEMBOURG'S SKILLS GAP?

The capabilities of artificial intelligence are widely feared both as a threat to jobs and a replacement for human skills in a wide range of fields. But what about in countries such as Luxembourg, where one of the biggest economic challenges is a chronic shortage of the skills businesses need, especially in the financial services sector, even when drawing on workforces in the surrounding regions of neighbouring countries? To what extent could AI fill the gap?

PwC's Olivier Carré believes AI technology can narrow the skills deficit, even if it may not represent a comprehensive solution. "Generative AI has the potential to address existing inefficiencies by bundling together a broad range of brainpower and skills," he says. "If we could free up some of this brainpower to perform higher added-value tasks, this should be beneficial for the overall resource situation in Luxembourg."

His own firm is actively pursuing these opportunities. "PwC Luxembourg is investing on its own account, jointly with PwC network initiatives and on a purely Luxembourg level, in the exploration of AI use cases to facilitate our work processes and address bottlenecks," he says.

"We are highly confident about the potential of GenAI to transform our internal processes, client service delivery in our assurance and tax advisory service lines as well as in the technology advice we provide to our clients and the trust services we provide on information that can be subject to GenAI."

Lack of risk appetite

According to the Luxembourg Chamber of Commerce, the country's businesses will need to recruit up to a staggering 265,000 new employees by 2030, of which 30% will probably occupy completely new posts. The ABBL's Ananda Kautz notes that the shortage of skilled staff in many economic sectors, not just financial services is a complex problem with multiple root causes ranging from housing to taxation.

AI will probably not be an all-in-one solution to the shortage of skilled staff in Luxembourg, but it can contribute to addressing the problem.

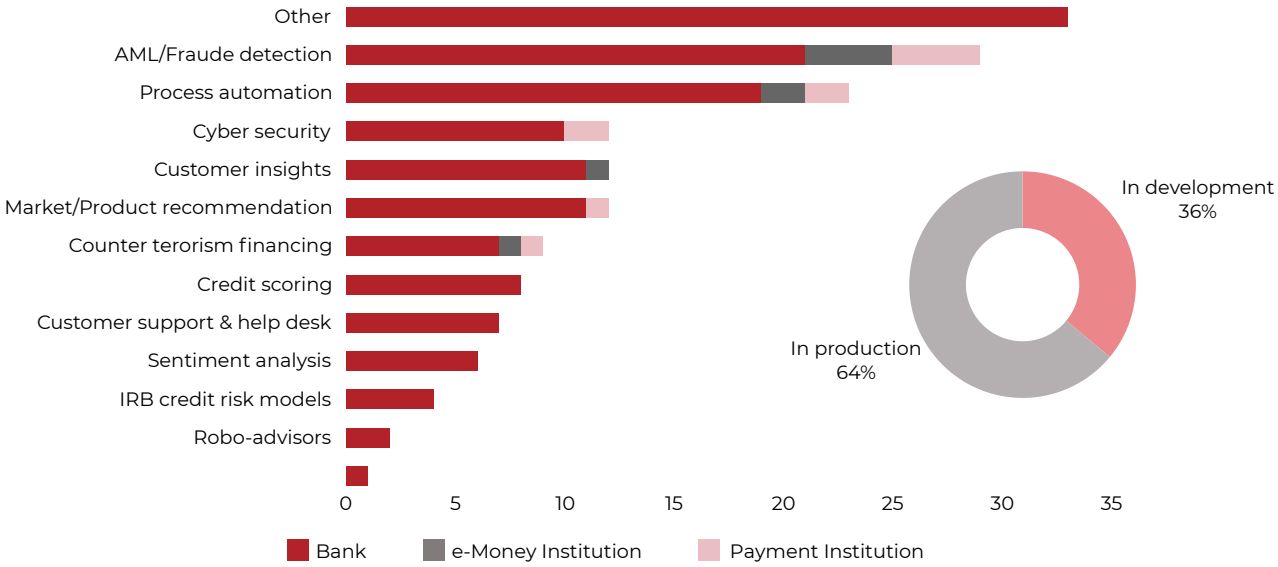
- Ananda Kautz,
Luxembourg Bankers' Association (ABBL)

"AI most likely will not be a one-size-fits-all solution in this regard," she says. "However, it can make a contribution to solving the problem. For example, automation of tasks with help from AI can free up skilled workers to focus more on other strategic and value-added tasks. This can effectively improve the supply of members of the workforce and partially address the shortage of skilled staff."

But SoftBrik's Romit Choudhury is less convinced that the technology can significantly address the country's chronic skills shortage, describing himself as "moderately pessimistic" about the degree to which AI can replace expensive and scarce human talent.

"Luxembourg's financial sector involves mostly operational entities in areas such as transfer agency, and decision-makers have low incentives to educate themselves or modernise except to reduce operational expenditure," he says. "However, using AI tools to do this at a profound level requires forward investment, making efforts to digitalise the workforce culture, for which there is neither risk appetite nor passion at a domestic level."

AI use cases in Luxembourg by type of institution



Source: The data above is from a joint survey conducted by CSSF and Banque Centrale Du Luxembourg. 158 use cases using AI technology were reported by the 138 supervised finance institutions that participated in the survey.

More scalable operations

Members of the financial sector are more upbeat, including several speakers at the 2023 ALFI Private Assets Conference who expressed confidence that AI has an important role to play in fund industry operations. Cara Browne, head of relationship management and provider oversight at private equity firm EQT Fund Management, says: "It is high on our agenda. We are using AI to make our operations more efficient and scalable, which could change the need to bring in people to Luxembourg."

Alan Dundon, president of the Luxembourg Alternative Administrators Association, L3A, notes that data firm Preqin has forecast 50% growth in worldwide alternative assets under management in the next five years, from $16 trillion to $24 trillion, and believes AI will be an important tool for fund service providers in handling the additional volume: "We certainly won't need to increase our workforce by 50%."

But AI will not eliminate the need for human beings to oversee and guide it, according to Yannick Bruck, chief technology officer at the Luxembourg Stock Exchange, which is using the technology to automate the extraction of information from legal and financial documents.

Speaking at the Institut Luxembourgeois des Administrateurs' Directors Day conference in November, he said: "If you see what is coming out of those [large language] models, you know you will still need people. Sometimes it generates brilliant ideas for people who are less experienced and for whom they make a lot of sense."

But, Bruck says, the imperfections of the technology also underline the importance of having people with the expertise to know when AI-generated ideas make no sense.

THE UNEASY INTERSECTION OF AI AND ESG

Some advocates of artificial intelligence believe that it can add momentum toward sustainability and climate goals by enabling financial institutions, regulators and others to gather and assimilate the vast quantities of complex data underpinning sustainable investment and decarbonisation strategies.

But critics counter that AI's principal impact on global warming is the greenhouse gas emissions it threatens to generate. And others are concerned that handing over key financial decisions to AI may negatively affect social issues, including by destroying jobs and perpetuating racial and gender bias.

At first sight, the proliferation of generative AI would appear to represent substantial technological support for the widespread embrace of sustainable finance, a field requiring the collation and analysis of a staggeringly vast range of information of different types, of varying completeness and reliability and in many different formats – a conundrum already overwhelming asset managers in Europe.

Manuel Bueno, director of climate finance at Rockville, Virginia, social sciences-focused consultancy Abt Associates, and Darius Nassiry, a vice-president and director at Washington, D.C., non-profit Climate Finance Advisors, identify six areas in which AI can lower barriers to climate finance, including creating an efficient and inclusive pipeline for climate-related investments through tools drawing on third-party datasets to identify climate finance opportunities that might otherwise be missed.

They also say AI-driven credit scoring models can more accurately and efficiently assess climate-driven borrower risks and opportunities, while AI tools can help structure transactions with improved risk-return profiles by proposing appropriate investment terms. Investors can use tools to reduce default risks through unstructured and qualitative early warning system data on evolving climate risks.

Monitoring ESG scores, detecting greenwashing

Finally, Bueno and Nassiry argue that AI-backed technical assistance can improve the risk-return profile of climate investments, and AI tools can help measure a portfolio's climate-related risks and their interconnections, prompting an appropriate risk management response. Overall, they say, AI can expand the opportunity set, lower costs and speed climate transactions, especially in emerging markets.

Such solutions are already entering the market. Clarity AI, a New York-based provider of sustainability data and analysis, will use Amazon Web Services' generative artificial intelligence, machine learning and analytics capabilities to enhance the environmental and social impact insights it provides to businesses and investors on companies, investment funds and local government entities, as well advice to shoppers on sustainability-focused electronics, fashion and apparel, groceries and household goods, and health and beauty brands.

Some investors also believe AI can play a role for investors in monitoring companies' ESG efforts and detecting discrepancies in their sustainability claims. According to Sarah Hargreaves, head of sustainability for Massachusetts-based financial advisory firm Commonwealth Financial Network, it can help them track the environmental impact of their investments against current and forthcoming regulatory standards: "AI's ability to manage and optimise ESG data would be particularly relevant for investors looking to delineate between dedicated ESG investments [and] those subject to greenwashing."

Luxembourg House of Fintech (LHofT) CEO Nasir Zubairi believes that AI can certainly enhance the quality and usefulness of ESG data. "Using techniques like natural language processing and image recognition, AI can process and interpret unstructured data, converting it into actionable insights," he says. "This capability will help provide a more comprehensive view of a company's ESG practices, combining structured metrics with qualitative insights from unstructured sources."

It can also help, he argues, with the thorny question of companies' ESG reporting – which is about to become more urgent in Europe with the progressive introduction of the Corporate Sustainability Reporting Directive, which will eventually affect at least 50,000 companies in Europe along with international groups that do significant business in the EU. Reporting under the CSRD on sustainability data from 2024 will begin for the biggest groups in 2025.

"AI can assist in standardising ESG reporting," Zubairi says. "With various metrics and standards currently in use, it can be challenging for investors and stakeholders to compare ESG practices across companies. AI can help by automating the process of collating data from various sources, standardising metrics and presenting them in a unified format."

Fragmented data

But in this area too, he emphasises, human beings will remain an essential part of the process: "Especially in understanding the nuances and context of ESG practices, human expertise will remain invaluable. Combining the computational power of AI with human judgment will pave the way for a more transparent and genuine sustainable business landscape."

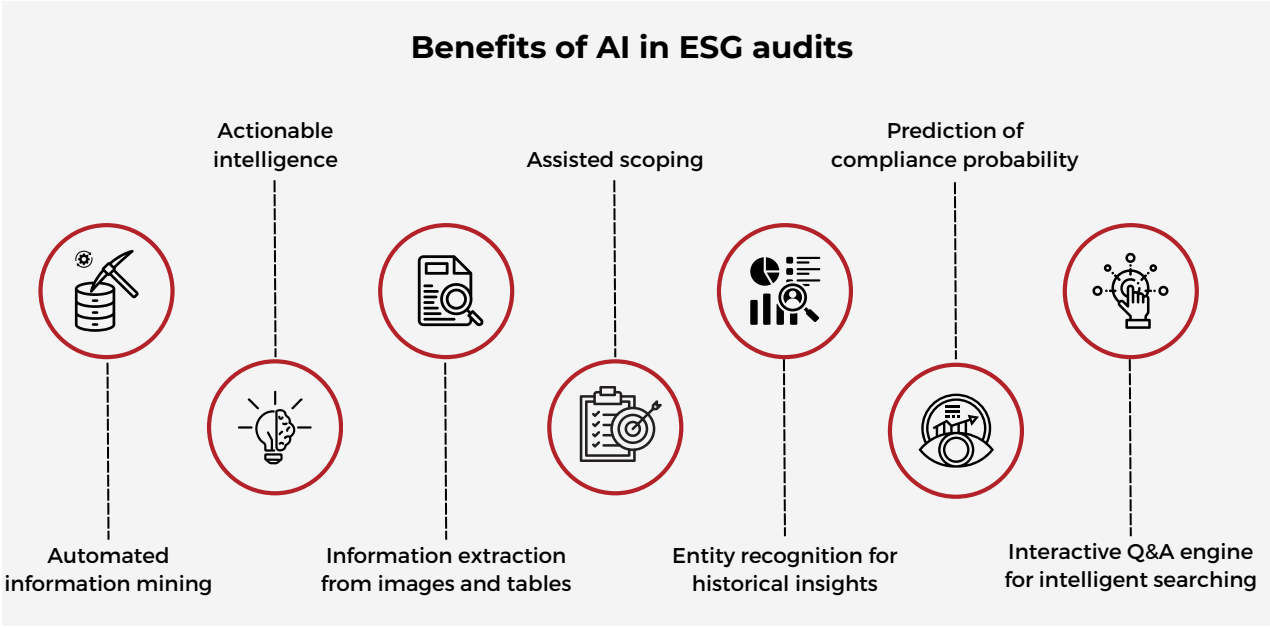
However, achieving this capability may be a challenging process, according to Softbrik's Romit Choudhury. While AI in theory can help to resolve the issue of unstructured data that is currently hard to aggregate with structured information, he cautions that in practice "ESG data are already so fragmented with noisy proxies that training any algorithm will be difficult".

Choudhury believes AI tools are unlikely to offer a magic bullet to tackle greenwashing in the near future. He says: "I expect internet-of-things tracking of emission data and peripheral processes like carbon accounting to become more transparent first before our models' confidence levels are reasonable enough to fact-check carefully manipulated exaggeration."

Meanwhile, even among its advocates there is concern about the implications of the impact on the environment of the computing power required by AI systems. According to the International Energy Agency, electricity demand from data centres and from data transmission networks each account for between 1.0% and 1.5% of global electricity consumption, and together generate around 1% of energy-related greenhouse gas emissions.

Although the IEA acknowledges that efficiency improvements have helped to limit growth in energy demand from data centres despite a surge in internet use since 2010, the agency says the sector's consumption needs to halve by 2030 to stay on track with the Paris Agreement

target of net zero emissions by 2050 – even amid exponential growth in development of energy-voracious AI models.



Energy-intensive AI training

Training AI models has a big environmental impact, according to Tanya Goodin, an expert in technology ethics and fellow of the Royal Society of Arts in London. She says: "Training artificial intelligence is a highly energy-intensive process [involving] deep learning, which involves processing vast amounts of data." She cites estimates from academic researchers that the carbon footprint from training a single AI model is 284 tonnes, equivalent to five times the lifetime emissions of the average car, while the energy usage of one super-computer is the same as that of 10,000 households.

This impact is not necessarily reflected in the emission reporting of AI providers and users, she argues, since – especially in the financial services industry – use of data centres for a variety of IT functions, including presumably an increasing share of AI-driven processes in the future, is largely outsourced to cloud service providers.

As scope 3 emissions arising from companies' supply chains, these may or may not be reported. Says Goodin: "AI is being sold as a solution to climate change -- and tech companies say there's huge potential for AI to be used to solve climate problems -- but actually it's a big part of the problem."

The highest-profile social issue arising from the adoption of AI is widely perceived to be the mass disappearance of clerical, administrative and creative jobs across a range of economic sectors, not least financial services. But the extent of job losses is for now largely a matter of conjecture, and there is a counter-argument that, in fact, generative AI may augment and enhance existing jobs rather than destroy them.

According to a report by the United Nations' International Labour Organization, most industries and jobs are only partly exposed to automation, and human roles are "more likely to be complemented rather than substituted by the latest wave of Generative AI such as

ChatGPT. Therefore, the greatest impact of this technology is likely not to be job destruction but rather the potential changes to the quality of jobs, notably work intensity and autonomy."

Reflecting or exacerbating social inequality?

The authors found that 5.5% of total employment in high-income nations would potentially be impacted by the automation capabilities of generative AI, compared with just 0.4% in low-income countries. They also reported that women were more than twice as likely as men to see their jobs affected by the impact of generative AI, primarily because of the over-representation of women in clerical work, especially in middle- and high-income countries.

And there are wider concerns – some that have been raised for years since the first emergence of AI and machine learning systems – about the choices and attitudes feeding into the creation of AI algorithms and the selection of data on which they are trained. The Bank for International Settlements noted in March: "Artificial intelligence and machine learning models, as with traditional models, can reflect biases and inaccuracies in the data they are trained on, and potentially result in unethical outcomes if not properly managed."

As long ago as 2019, a study by Trishan Panch and Heather Mattie, co-directors of the AI for Health Care: Concepts and Applications programme at the Harvard T.H. Chan School of Public Health, identified as an example racial factors that skewed decision-making on which patients were in particular need of treatment. They concluded that algorithms in healthcare technology do not simply reflect social inequities but may ultimately exacerbate them.

In the financial services industry, the alarm has already been raised on both sides of the Atlantic about the failure of providers to consider the potential harm of the systems they use, for example, to make decisions in areas such as lending and insurance – including discrimination according to applicants' racial origin or their socio-economic background.

Credit scoring is an extremely sensitive area in which to deploy AI, as the European Commission has recognised in drafting the AI Act, which categorises such algorithms as high-risk and subject to tighter restrictions than other use cases.

But as the use of the technology expands, its applications become more complex and sophisticated, and its impacts on business decisions becomes harder to track, such questions are likely to be heard more frequently.

THE EU'S AI ACT: ENTER THE BRAVE NEW WORLD OF AI REGULATION

What European Union leaders have acclaimed as a landmark in the worldwide regulation of artificial intelligence has been achieved with agreement in principle by legislators on December 8 on the AI Act, billed as the world's most restrictive regime governing the development of the technology. But while advocates argue that the legislation will provide critical protection against unbridled development and deployment of harmful AI applications, critics fear it will stifle innovation and tie up entrepreneurs and developers in bureaucratic red tape and legal compliance.

The consensus reached by the European Parliament and the EU Council, representing member states, followed three days of intense negotiations overseen by EU commissioner Thierry Breton. He argues that the Regulation laying down Harmonised Rules on Artificial Intelligence, as the legislation is formally known, will not only put Europe in the forefront of setting clear rules for the use of the technology, but create "a launchpad for EU start-ups and researchers to lead the global AI race."

The EU is not alone in rushing to put AI regulation in place. In August, the Cyberspace Administration of China published the awkwardly-named Provisional Provisions on Management of Generative Artificial Intelligence Services, which stipulate that such services should not generate content inciting subversion of national sovereignty or the upending of the socialist system, or advocating terrorism or extremism, promoting ethnic hatred and ethnic discrimination, violence and obscenity, or fake and harmful information.

Analysts say the Chinese rulebook has been watered down from a version put forward for consultation in April. Matt Sheehan, a fellow at the Carnegie Endowment for International Peace, says its scope has been narrowed from all uses of generative AI to just those that are public facing, implying less strict requirements on internal uses, and some of the language has become less prescriptive. The final text also contains language encouraging the development of generative AI rather than being purely punitive.

Biden's executive order

In October, US president Joe Biden issued an executive order, which has the force of law, intended to manage the risks posed by AI to national security, consumers, employees and minority groups. It imposes new safety assessments, introduces equity and civil rights guidance, and requires research to be carried out on the technology's impact on the labour market. It requires some AI companies to share safety test results with the federal government before the release of their systems, directs the Commerce Department to create guidance for AI watermarking, and institutes a cyber-security programme to create AI tools for stress-testing critical software. The measures are to be phased in over a year.

Like the European law, the US executive order has drawn criticism of government overreach from industry leaders; trade association NetChoice described it as a recipe for red tape that will stifle new competitors from entering the market. The measure goes beyond self-regulation commitments made by leading AI sector participants earlier this year, but companies including Microsoft, OpenAI, Anthropic and Google are still proceeding with initiatives such as the Frontier Model Forum, including the pledge of $10m to a safety fund focusing on risks such as the potential to design bioweapons and facilitate hacking.

Other countries with internationally-focused financial sectors are also launching initiatives to regulate the development of AI. The Monetary Authority of Singapore is partnering with banks and technology groups to develop a risk framework for the use of generative AI and consider how the technology can be used in the financial services sector. The group has already released a white paper examining areas such as cyber-crime methods, copyright infringement, biases and personal data risks and will next look at potential use cases, including complex compliance tasks and whether AI can identify obscure financial risks.

Meanwhile the Dubai International Financial Centre has become the first authority in the Middle East to update its Data Protection Regulations to cover the use of autonomous and semi-autonomous AI to process customers' personal data. Use cases are to be tested through further consultation, inspection or supervision, and DIFC commissioner of data protection Jacques Visser says his office is also considering AI systems through participation in a regulatory sandbox involving technology developers, users, regulators and non-governmental or public bodies.

Risk-based approach

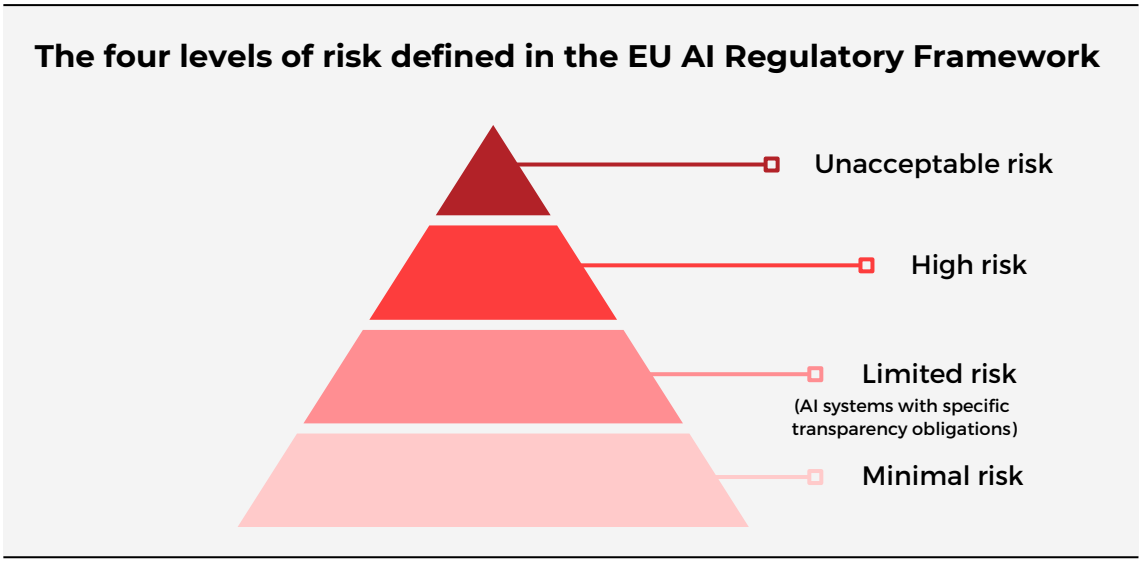
The EU's AI Act encompasses a two-tier approach incorporating transparency requirements for all general-purpose AI models such as ChatGPT along with stronger safeguards for powerful models with systemic impact throughout the union. Breton and his colleagues believe the legislation can deliver appropriate protection for the use of AI without an excessive burden on companies through a risk-based approach: "The higher the risk, the stricter the rules."

The EU Council says key elements of the draft AI Act as agreed include rules on high-impact, general-purpose AI models that can lead to systemic risk in the future, as well as on high-risk AI systems; a plan of governance with some enforcement powers at EU level; an extension of the list of prohibitions but opening the door to the use of remote biometric identification by law enforcement authorities in public places, subject to safeguards; and protection of rights through the obligation on deployers of high-risk AI systems to conduct a fundamental rights impact assessment before putting it into use.

The legislation also introduces bans on using AI for social scoring – evaluating or classifying the trustworthiness of individuals based on the collection of data relating to their social behaviour – and systems that "manipulate human behaviour to circumvent their free will, or that exploit individuals vulnerable because of their age, disability or economic situation". Violations of the AI Act can be punished with fines of €35 million or 7% of a company's global revenue.

The ABBL's Ananda Kautz understands the urgency of legislative action. She says: "The fast and potentially disruptive nature of developments in AI technology has raised concern among experts and policymakers about the variety of applications of the technology and the difficulty in predicting its impact on security, the economy, politics and sovereignty, and the well-being of citizens.

"AI regulation will ensure that Europeans can trust the AI they are using, and it is also key to building an ecosystem of excellence and strengthening the EU's ability to compete globally." Kautz notes that the AI Act aims to address risks of specific uses of AI, categorising them according to four different levels: unacceptable risk, high risk, limited risk, and minimal risk.



AI financial sector use cases

Financial services are not the main focus of the legislation, she says, but points out that the draft regulation lists two types of high-risk AI system that can be applicable to the financial sector: those intended to be used for real-time and subsequent remote biometric identification of individuals, and those designed to evaluate people's creditworthiness or establish their credit score, apart from systems implemented by small-scale providers for their own use.

She adds: "The European Banking Federation and the ABBL have been working on advocacy relevant to this important regulatory matter, because the banking community is interested in a freer usage of AI for many use cases including remote biometric identification for know-your-customer and anti-money laundering purposes and creditworthiness assessment, without stifling innovation."

Leading companies in other sectors have already voiced alarm that excessively restrictive rules on use of a fast-evolving technology will hamper innovation. In June, the business group DigitalEurope, whose members include auto manufacturer Renault, pan-European aerospace group Airbus, beverage producer Heineken and German technology and engineering group

The tension between privacy rights and the benefits of data access is palpable...Transparent data handling practices, robust encryption, and clear consent mechanisms are essential. It's not a zero-sum game; with the right frameworks in place, we can harness the power of AI while respecting and upholding privacy.

- Nasir Zubairi,
Luxembourg House of Financial Technology

Siemens warned that the rules as then proposed were so restrictive they threatened to choke off innovation in Europe.

Last month DigitalEurope repeated its warning, focusing in particular on the rules relating to foundation models such as OpenAI's ChatGPT – AI systems trained on large sets of data that are capable of learning from new data to perform a range of tasks: "For Europe to become a global digital powerhouse, we need companies that can lead on AI innovation also using foundation models and GPAI [general-purpose artificial intelligence]. We see a huge opportunity in foundation models, and new innovative players emerging in this space, many of them born here in Europe. Let's not regulate them out of existence before they get a chance to scale, or force them to leave."

PwC's Olivier Carré believes the AI Act is an important step in the right direction, but it may not be the final word. "History has demonstrated that in any technology or innovation, there are risks and opportunities," he says. "The role of supranational institutions, states and regulators is to either predict such risks and anticipate – the ideal – or to act once a problem has occurred, which is the more common scenario. The AI Act complements a more comprehensive set of rules regarding data protection, data privacy and operational resilience.

"Will this regulation forestall certain innovations? Maybe. But the question is whether these innovations and use cases are actually useful for society. We remain confident that economically viable use cases of GenAI that produce value for the economy and society will survive any regulatory constraints, and maybe even prosper and scale better in such an environment. Will we need to adjust once we learn to use GenAI better? Certainly, but that's what adaptive systems are all about."

Balancing privacy with AI models' data access

LHoFT's Nasir Zubairi points to the difficulty in striking a balance between individuals' rights to privacy and confidentiality and the benefits of massive access to data by AI models. He says: "The tension between privacy rights and the benefits of data access is palpable. While AI models thrive on vast data sets, it's crucial to ensure that individuals' rights aren't compromised. Transparent data handling practices, robust encryption and clear consent mechanisms are essential. It's not a zero-sum game; with the right frameworks in place, we can harness the power of AI while respecting and upholding privacy."

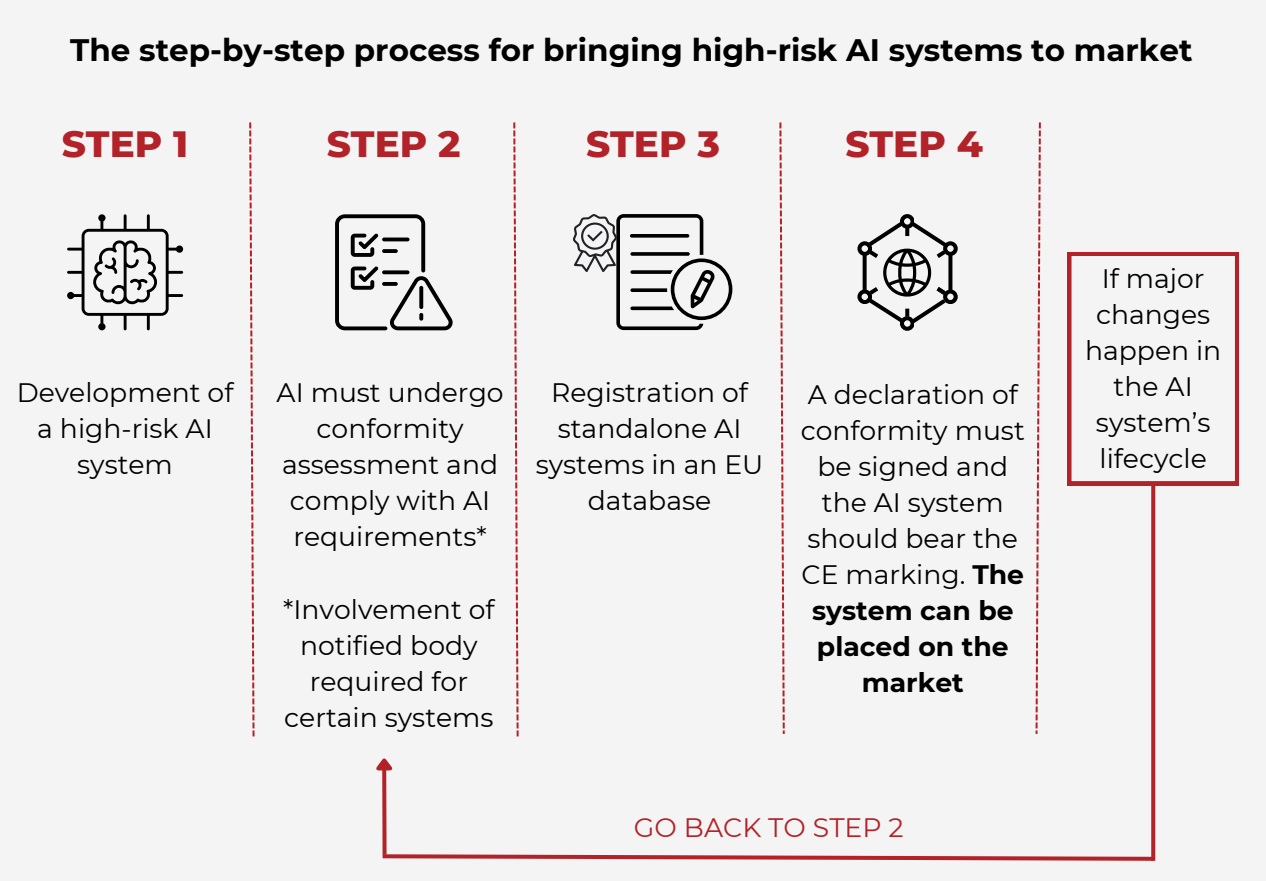
It's part of a broader imperative of transparency and honesty in the interaction between clients and institutions, he argues: "I fundamentally believe that if you clearly express to people how you want to use their data to create better products and services and perhaps lower their cost, guarantee that personal data will not be shared with third parties, and express clearly and in plain language – not legalese – where and how personal data will be used internally, you can obtain widespread authorisation to use the data.

"Trust is at the core of financial services, so why not imbue trust in how you use data? This is not the same as simply taking the position, as is the case today, that the institution won't use customer data, and therefore will miss out on the benefits to both the institution and the customer."

SoftBrik's Romit Choudhury says most consumers have a weak understanding of privacy, what companies can capture and even their own rights. He says: "There will potentially be erosion of privacy compared with today, but AI tools will also offer avenues to strengthen your personal

privacy, like AI-driven advertisement blockers on people's web browsers that stop suspect websites opening without warning."

Resolving the issue of copyright infringement and fair use in the development of large language models is a much harder issue to resolve, Choudhury says, since training data may infringe on the rights of available creative works. He says: "A lot will depend on the level of training, and the creator's ability to prove that the training led to copying or damage. I think there will be a happy human-machine hybrid medium somewhere — the line is hard to draw, but efforts have started already."



ABOUT THE EXPERTS

We would like to extend particular thanks to various leading figures in Luxembourg's financial industry who provided us with their views and analysis on the issues we identified for this white paper. We are extremely grateful for their time and insights.

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Claude Marx was appointed director-general of the CSSF, Luxembourg's financial regulatory authority, by the Luxembourg government in February 2016. He is also a member of the board of supervisors of the European Securities and Markets Authority. Previously, Claude was CEO of Lombard International Assurance and also chairman of the board of Lombard Intermediation Services. Previously he worked for HSBC for 17 years, and was deputy CEO of its private banking division. Claude is a lawyer by training, and holds a master's degree in law from the University of Paris and a master's in international business law from the University of London. He was admitted to the Luxembourg bar as an Avocat à la Cour in 1990.

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