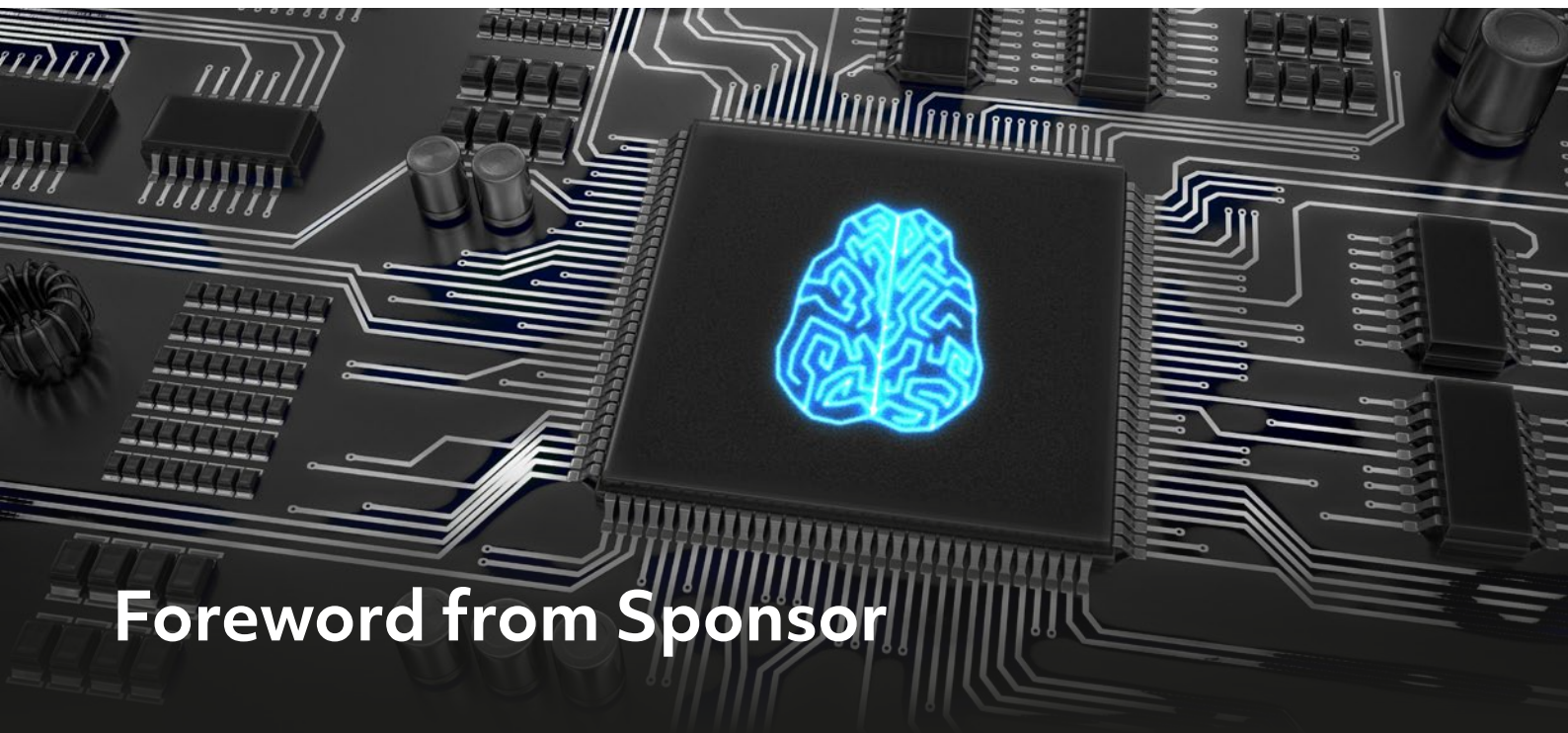# Using AI Intelligently:

Smart ways to use Artificial Intelligence in Payments

The Payments Association's Guide to AI

Sponsored by

Fable

# Foreword from Sponsor

**I** have been fascinated by the advent and growth of Artificial Intelligence (AI) in general over the last 5-8 years. My passion is 'payments' and in particular the cross-border movement of funds which has seen vast improvements in efficiencies over the last few years. I believe the growth of AI into this area will accelerate that improvement and reduce cost whilst getting payments close to real time. In this whitepaper, you will see the various uses that AI is adopting in the payments arena and how this is driving change for the better. At the end of the day, we all want to see payments invisibly woven into the fabric of everyday life without the need to think about it, but without sacrificing convenience for security. Let's see what the next decade will hold for payments - I am already excited and looking forward to the journey and being able to assist the industry with Fable Fintech's every growing portfolio of tools. Acceptance of such a payment system depends on trust, and the moral of the AI 'fable' is that such trust has to be earned. Fable Fintech is ready to earn and prove that trust.
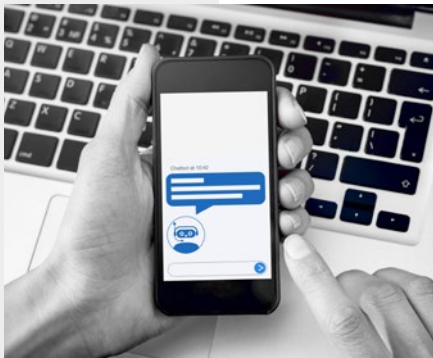
**Nashaud Contractor**
CEO

*Fable*

> "
> In this whitepaper you will see the various uses that AI is getting into in the payments arena and how this is driving change for the better.

# Contents

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# What is artificial intelligence?

## Introduction

The concept of artificial intelligence (AI) has been around for a long time and is now making major inroads into financial services. AI has a significant impact in areas such as fraud and compliance, credit scoring, financial distress prediction, robo-advising and algorithmic trading in many financial services firms. For example:

- 70% of all financial services firms are using machine learning to predict cash flow events, fine-tune credit scores and detect fraud [1]
- 54% of financial services organizations with 5,000+ employees have adopted AI [2]

This is because AI can carry out processes at scale faster and quicker than humans. It can also make inferences that a human would miss when it comes to spotting patterns and linking up seemingly disparate sources of information. However, the application of AI in payments has not been well researched, nor is its application in payments well understood.

**Fable Fintech**,[3] a Community Patron of the **The Payments Association** specialising in international remittances, commissioned this whitepaper to address this shortfall, for which the payments community is grateful. We also appreciate the input of those attending two CEO Round Table workshops, where the potential of AI in payments was explored. Their input into this research was both formative and essential.

1   **Digital Banking Maturity: How Banks are Responding to Digital (R)evolution**, *Deloitte; 2020*
2   **Economist Intelligence Unit Study, The Road Ahead: Artificial Intelligence and the Future of Financial Services**, *The Economist; 2020*
3   *For more information about the services provided by Fable Fintech, visit* **www.fablefintech.com** *or contact* **lucinda.groves@fablefintech.com**

## Interviewees With thanks to…

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **David Birch** Global Ambassador **Consult Hyperion** | **Mike Doyle** Chief Technology Officer **Cinnte Solutions** | **Brian Halpin** SVP, Advisory – Customer Strategy and Transformation **Blue Prism** | **Martin Runow** Global Head of Payments and Digital, **Barclays Corporate Banking** | **Alessandro Tonchia** Head of Strategy, Private Banking & Wealth **InvestCloud** | **James Thomas** Chief Executive Officer **Itemize** | **Gergo Varga** Content Manager **SEON** | **Yin Lu** Global Head of Product for RegBrain, **CUBE** |
| Interview | Interview | Interview | Interview | Interview | Interview | Interview | Interview |

## Drivers of AI

The business drivers of AI technologies are:

- **Boosting revenues through increased personalisation of services to customers and employees.** One of the most powerful enablers of a strong customer experience is personalisation. By leveraging different types of AI, companies can unlock insights into consumer behaviour. This allows for tailor-made decision-making and the ability to offer what a customer wants and needs at the point when they need it.

- **Lowering costs through efficiencies generated by higher automation, reduce error rates and improve resource utilisation.** Better processes and efficiency also contribute to

customer-centricity – increasingly so as banking and investment products have become largely commoditised. AI-powered analytics can improve how these services are delivered, providing differentiation and contributing to a competitive edge by enhancing customer experiences. More than 50% of 2,056 recently-surveyed IT and line of business decision-makers and influencers say that customer experience is their leading driver for AI adoption.[4]

- **Uncovering new and previously unrealised opportunities** based on an improved ability to process and generate insights from vast troves of data, according to a study involving over 25 use cases.[5]

- **Driving growth by reducing risk and optimising processes to drive down costs.** This is especially true for anything that is volume-

based and reliant on speed and accuracy, such as payments processing or regulation.

- **Satisfying the regulator.** Regulators the world over require auditable processes and decisioning, and AI can help payments firms provide this in a cost-effective, non-manual way.

- **Faster computing power.** Although the historical annual improvement of about 40% in central processing unit (CPU) performance in computing is slowing, the combination of CPUs packaged with alternative processors is improving at a rate of more than 100% per annum. Although 'Moore's Law' is no longer strictly true, computing power is still growing exponentially every year, allowing AI to utilize faster and cheaper computing capacities.

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4    **AI Strategies View 2020, IDC Corporate**, *Executive Summary; April 2020*
5    **AI-bank of the future: Can banks meet the AI challenge?**, *McKinsey & Co; September 2020*

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**Moore's Law:** The number of transistors on microchips doubles every 2 years
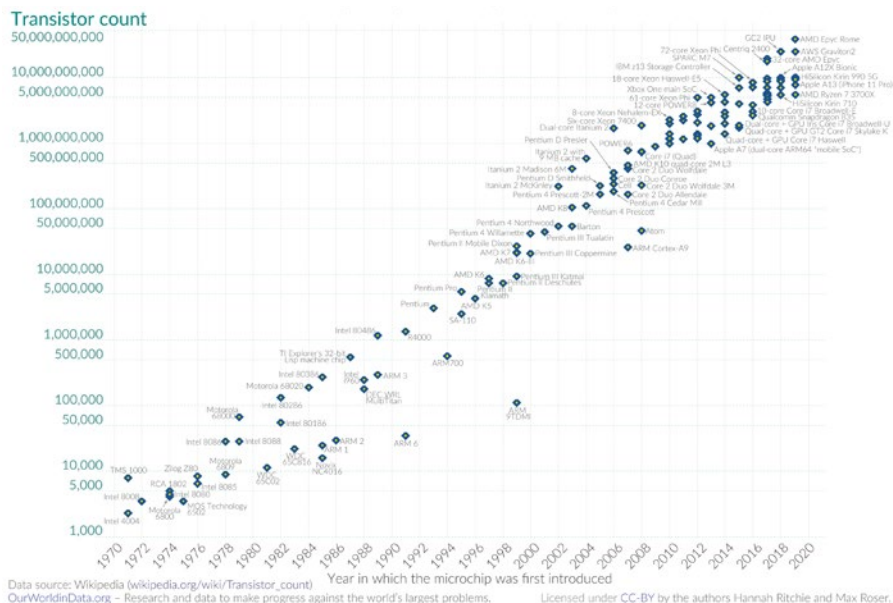
*Source: https://en.wikipedia.org/wiki/Moore%27s_law#/media/File:Moore's_Law_Transistor_Count_1970-2020.png*

Moore's law describes the empirical regularity that the number of transistors on integrated circuits doubles approximately every two years. This advancement is important for other aspects of technological progress in computing - such as processing speed or the price of computers.

> **"**
> "AI can massively improve any process that has large data volumes and is complex. Compliance, fraud and audit are all good examples. In the UK, for example, the Faster Payments Scheme means data transfer is instantaneous. This has necessitated the systems and processes to be able to check for fraud in almost real-time. There is also a need for real-time risk scoring and this is another thing we will be aggressively pushing over the next three to six months."

**JAMES THOMAS**
CHIEF EXECUTIVE OFFICER
**ITEMIZE**

## What is AI and how is it applied?

All AI applications attempt to replicate, as far as is possible, human ability – but at scale. AI means different things to different people and is used for a range of applications. The most common confusion around AI is Machine Learning (ML) or training machines to look for and recognise patterns within data sets, with ML then predicting what might happen next. ML is simply a subset of AI and, indeed one of many, but they are often confused.

Cognitive Reasoning (CR) – replication of the human judgment process – is another subset within this broad AI application, as is Deep Learning (DL) – learning by example, which again is actually a subset of ML!

These applications of AI largely rely on having large volumes of structured data to analyse and learn from. They are looking for the anomalies within a sea of data points. According to a **Fortune Business Insights report, 'The artificial intelligence market'[6]**, **ML** is likely to see the most growth, due to it being able to spot patterns and trends and to extract data 'en masse'.

Other applications of AI look at unstructured data and information and rely much more on intuitive decision making. **Natural Language Processing** (NLP), drawing conclusions from natural language data – and **Semantic AI** (understanding text) are good examples. They can be used to look at masses of unstructured data to build a profile, linking seemingly

6    **Fortune Business Insights: AI Market Size, Share and COVID-19 Impact Analysis**, *Fortune Business Insights; 2021*

## Indicative Split



Other

Computer vision

Machine learning

Natural language processing
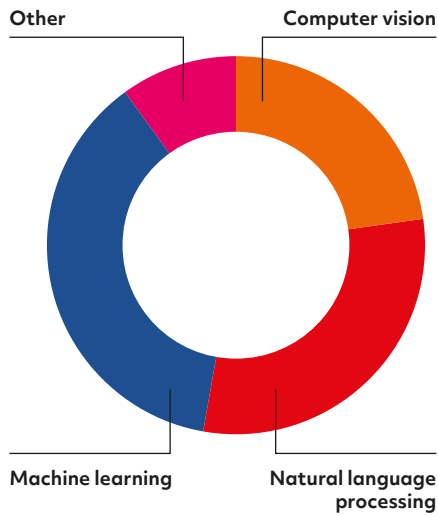
## As AI Matures, Inference will Dominate



100

0

% of spending

Modeling

Inference

Fraud detection, adtech, pricing, weather, categorization, recommendation, engines, supply chains, drug provenance…

Level 3 autonomous driving, traffic optimization, AR/VR, power grid, new payment systems, on-shore manufacturing, machine diagnoses, smart factories, automated retail, intelligent robots, content production, intelligent call centers…

Smart phone, Alexa, facial recognition, NLP, low level autonomous driving (e.g. lane warnings), Brave Browser (BAT), DeFi/ Blockchain, Gaming

Autos, healthcare, financial services, retail, media, government/defense, cyber security, education

2020　　　　2025　　　　2030

disparate information together to build a profile, and using this to draw inferences and conclusions about someone or something. Common uses are within chatbots or when personalising an offering.

**Computer Vision** is how computers can gain high-level understanding from digital images or videos. It seeks to understand and automate tasks that the human visual system normally carries out.

The Fortune Business Insights report (above) predicts that NLP will grow due to its ability to help with customer preferences, buying behaviour, decision making processes and personalisation. The figure above shows that Machine Learning was the biggest use of AI in 2020, but that NLP and Computer Vision are also significant.
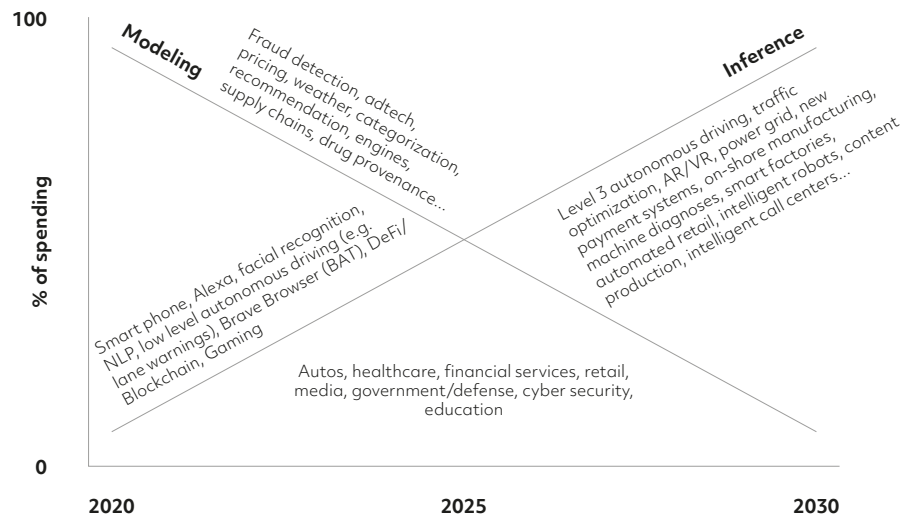
Some applications of AI are predicted to mature as inferences become more mainstream; i.e. AI will be used to carry out analysis that no human brain could do in terms of connecting things. The above conceptual chart by Silicon Angle maps the relative spend on

modelling applications of AI, versus inference applications through the current decade.

## What is the difference between AI and ML?

Artificial intelligence is a field of computer science which makes a computer system that can mimic human intelligence. If we start by breaking AI into its two words, we have 'Artificial', which refers to something which is made by human or a non-natural creation and 'Intelligence', which means the ability to understand or think. There is a misconception that Artificial Intelligence is a system, it is not; AI is implemented in the system. A common definition is that "it is the study of how to train computers so they can do things which at present a human can do better." Therefore, it is an intelligence where we want to add all the capabilities to a machine that humans today can offer.

Machine Learning is the learning in which a machine can learn by its own without being explicitly programmed. It is an application of AI that provides the system with

the ability to automatically learn and improve from experience. A definition is thus, "machine learning is a subfield of artificial intelligence, which enables machines to learn from past data or experiences without being explicitly programmed." To that end, the machine can then use the learnings to make predictions or take some decisions using the historical data without being explicitly programmed. Machine learning generally uses a massive amount of structured and semi-structured data so that a machine learning model can generate accurate results or give predictions based on the data.

ML can be divided into three types:

1.  Supervised learning
2.  Reinforcement learning
3.  Unsupervised learning

In summary, this means that all machine learning is AI, but not all AI is machine learning. AI solves tasks that require human intelligence while ML is a subset of artificial intelligence that solves specific tasks by learning from data and making predictions. ■

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# Artificial intelligence use cases

## AI and payments

The value of AI in the payments industry has, to date, been largely focused on optimisation. Any function that has high volume, high frequency and repetitive and relatively structured data can benefit from AI. However, as AI matures, it will become increasingly useful in payments for inferences and analysis in addition to optimisation.

**Transaction banking and treasury**
AI can help make Treasury and Transaction Banking become more efficient, lower risk and less costly by using ML and Deep Learning in three ways.

Firstly, AI can help with payment investigation and support; identifying when something has gone wrong and fixing it to provide a quick and seamless payments system, thus meeting customer expectations of quick and efficient payments processing. Secondly, AI can help with decision-making on routing payments. This becomes more relevant with the continued growth of payments methods and
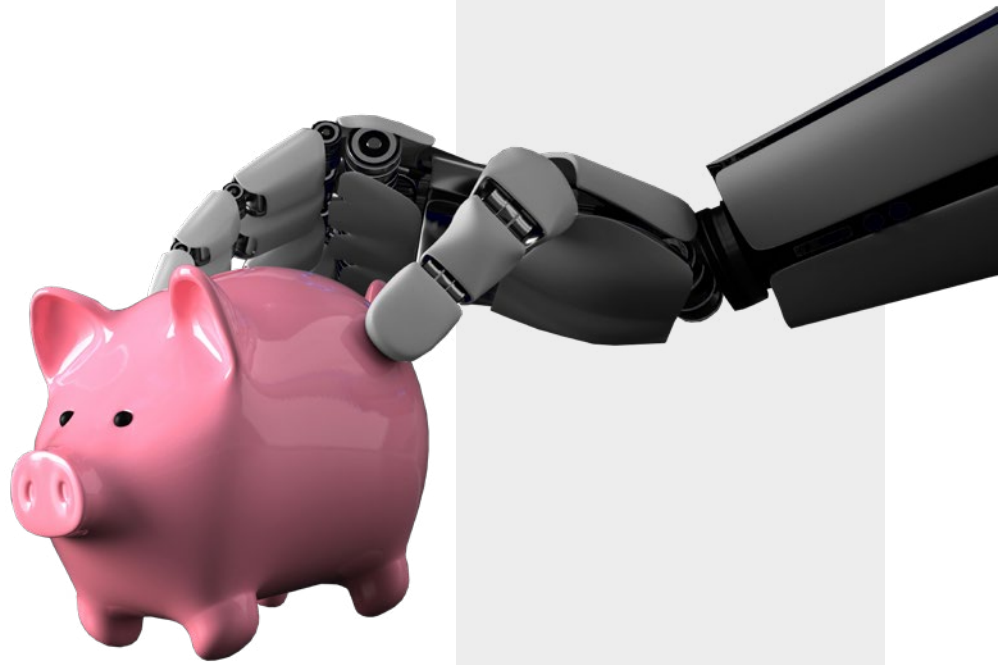
routes. Finally, AI can help with sweeping funds from one account to another based on certain conditions, thereby enhancing the ability of the treasury function to spot liquidity gaps and quickly offset corporate debt and credit against capital in real-time. It

can accurately model the likely impact for example, when looking for the best pool of liquidity within a foreign exchange market. The treasurer can use historical patterns to identify what is needed and when to fill gaps or realign existing assets.

"

"Order routing is a really good example of AI in use. The end customer does not care which rail a payment has travelled on – the job is to make it travel on the best one and do it quickly and without issue. A good system should use AI to do this."

**MARTIN RUNOW**
MANAGING DIRECTOR, GLOBAL HEAD OF PAYMENTS, FX AND DIGITAL
**BARCLAYS CORPORATE BANKING**

## Document management

Document management lends itself well to deploying AI in payments.

AI is used to read accounts payable and invoices to automate a process and decide what to do next. Invoice Capture and Reconciliation converts documents into rich data sets for financial applications. It also cross-checks information, and augments content with additional sources. When reconciling invoice data with POs and other information, AI-enhanced automation decreases the need for costly manual reconciliation and improves the effectiveness of compliance and audit functions.

Optical Character Recognition (OCR) has been around for a long time, but this is equivalent to a child learning their letters, compared with

> **"**
> Only AI can make the leap to extract meaningful data from such a complex picture.

AI, which is the equivalent of reading whole words and understanding what they mean in the context of a chapter in a book. In document data extraction, the characters are easy to extract, but AI can deduce, for instance, whether a row of numbers on a document is a date, a purchase order or the total amount.

This is even more challenging 'in the wild', beyond walled gardens where invoice formats can be mandated. Where any company is using accounting software, the formats and structures of documents, even using the same software, can vary hugely and no 'formal' set of rules would work as there are so many variations. Only AI can make the leap to extract meaningful data from such a complex picture.

## Credit scoring

AI is a valuable tool for credit scoring, which determines the affordability and likelihood of default under a range of scenarios, by producing a mathematical model based on statistical methods and accounting for a large amount of information. Traditionally credit scoring only considered an applicant's payment history, existing debt burden, length and variety of credit history and whether they had recently asked for credit elsewhere. This system produces 'out of date' results with little relevance to today's fast-moving economy.

### Case Study
Document Management – Itemize

The Itemize platform reconciles invoice data with POs and other information in order to decrease manual reconciliation, improve compliance, and automate audit functions. The service is available via easily implemented APIs for real-time or batch production.

Receipt Data Capture and Matching also converts receipt documents into rich data sets for financial applications. The solution reads receipt images, pdfs, emails, and text files in any layout. Using Computer Vision, Artificial Intelligence, Machine Learning, and other technologies, the platform captures rich data, cross-checks financial information, and augments content with additional sources about the transaction.

The platform also reconciles receipt data with financial transaction information, such as credit card data or travel and entertainment (T&E) report information, in order to support compliance and policy controls. The service is available via easily implemented APIs for real-time apps or batch production.

Additionally, VAT Capture and Processing helps automate business VAT tracking, reporting, and reclaims. The platform captures rich VAT and sales tax data, cross-checks information, and augments content with additional sources. The platform also reconciles document data with financial transaction information, such as credit card data or T&E report information, in order to support VAT tracking, reporting, and reclaim needs.

AI enables analysis on a very granular and personalised basis, and uses an array of real time factors, including current income, employment history and earnings potential. This data is becoming more readily available as 'Open Banking/Open Finance' spreads globally – see The Payments Association's Report on Open Banking - "**Power to the People: How Open Banking is Transforming How we Access and Manage our Money".**[7] This results in a more complete and forward-looking credit score that is more personalised and sensitive to smaller changes, whether positive or not. The credit score is then combined with risk-based pricing – including the interest rate – to make an offer or not, and to define the terms and price. This has been particularly useful in supporting financial inclusion. In particular, applicants with poor or thin traditional credit files who would otherwise have automatically had their applications turned down will have further data used to assess them.

The use of AI in credit scoring can deliver impressive results. A recently published case study quoted an AI solution catching 83% of bad debt[8] not caught by a credit score. This drastically reduced the bank's exposure to credit risk. If comfortable with this rate of default, the bank could lend to 77% more people, not only generating more profits but also leading to greater financial inclusion.

## Fraud

AI is used within payments to identify fraud. It identifies breaks in patterns of behaviour or the existence of suspicious counterparties or activity by a counterparty, recognising what is unusual and whether a counterparty has any sanctions or red flags set against it.

Increased adoption of digital tools and digital payments by consumers has resulted in a significant increase in fraud in the last decade. In particular, Card Not Present (CNP) transactions have increased dramatically, with these transactions accounting for 27% of all debit transactions in 2019 and increasing 10 times faster[9] than Card Present transactions. The potential for fraud has risen too, with businesses striving to meet consumer expectations. 92% of consumers[10] expect a fast, frictionless experience that is also as trustworthy and secure as possible.

Every time a consumer spends, details about that transaction create a footprint relating to their preferences, behaviours and attitudes. With the application of AI, the industry can use this data to identify anomalies which could indicate potential fraud:

1. **Who:** phone number, KYC info, card number
2. **When:** time of day, day of the week
3. **Where:** location of spend, address of POS terminal, merchant
4. **What:** currency, MCC code
5. **How:** device, behavioural mouse track/screen track

False positives are reported to be the largest area of merchant losses at c.10-15%.[11] AI can reduce false positives by applying a secondary layer of questioning to something that has been flagged as potentially suspicious. This improves accuracy and efficiency and also supports the cost and the customer service drivers for AI adoption.

7 **Power to the People, How Open Banking is Transforming How we Access and Manage our Money**, *The Payments Association; 2021*
8 **Case Study on Swedish Bank Credit Scoring Using AI**, *Kortical; 2020*
9 **2020 Debit Issuer** *Study, Pulse; 2020*
10 *Article by Beth Shulkin, Total Retail,* **https://www.mytotalretail.com/article/survey-modern-consumers-demand-fast-and-secure-digital-experiences/**
11 **False Positives: The Biggest Loss of Value in e-Commerce**, *Christopher Brennan; June 2021*

Identifying fraud can be like finding a needle in a haystack, so access to vast amounts of cleansed and usable data is critical and it is therefore more successful in sectors with large flows of payment transactions. This requirement for scale can be challenging for smaller organisations, although the major fraud companies will often aggregate anonymised data to provide deep enough pools to support effective analysis.

Furthermore, cyber-criminals leverage AI to detect patterns or anomalies within a system that might be vulnerable to attack, so banks need to use AI tools to routinely run in the background of both institutional and retail payments looking for suspicious patterns or sequences, such as a regular payment that suddenly has a change of IBAN or IP address.

## Compliance

AI enables businesses to understand and meet regulatory obligations at a high level. Fraud, credit scoring and risk all contribute to this, but these downstream applications cannot function effectively unless there is top-level understanding of the requirements and where they touch.

"

"The volume, velocity and complexity of regulation and the pace of change since the crisis of 2008 means that AI is needed to stay on top of everything. AI is unavoidable."

**YIN LU**
GLOBAL HEAD OF PRODUCT FOR REGBRAIN, **CUBE**

AI supports compliance – sometimes referred to as governance – by applying specific regulations, company rules and policies to a particular business area, understanding how these should be implemented and then mapping it onto internal infrastructures and processes. The AI needs to be able to read the entire regulatory internet and apply it where relevant as well as understand what a company's own internal policies and procedures are.

To do this, customised crawlers are deployed. These are then supplemented with ML and Semantic AI to analyse what the crawlers have collected and to understand how to apply it, using classification, language and translation to produce something useable.

The global AI market for compliance and governance is projected to reach US\$1,016m by 2026[12] growing at a CAGR of 65.5% from a base of some US\$50m in 2020.

## Case Study
Compliance - CUBE

A large US bank had a pre-existing, automated regulatory change solution, but it wasn't driving automation or efficiency. By its own admission, the system worked, but the bank was not confident that its existing offering was watertight. The organisation had been using a legacy regulatory change system for some time. It was going through

organisational change and wanted to streamline compliance operations across the board.

As well as procedural inefficiencies, the bank was also looking to fill some gaps that had appeared in its existing regulatory inventory. It wanted a product that would map its relevant regulations through to

its controls and integrate with its existing governance, risk and compliance program.

CUBE deployed AI solutions to address the bank's existing inefficiencies and consolidate all its systems into one solution. As a result, the bank increased efficiency in its compliance processes by 50%.

12   **AI Governance Market by Component**, *Markets and Markets; 2020*

## KYC and AML

AI can reduce cost and risk by automating many Know Your Customer (KYC) and Anti-Money Laundering (AML) tasks that are currently performed manually by compliance and financial crime specialists. This frees up time for those professionals to make more thorough assessments of the risks and address individual cases more diligently.

KYC/AML is a catch-all term for a number of important areas including Basic and Enhanced Due Diligence (EDD), Ultimate Beneficial Ownership, and transaction monitoring. For EDD in particular, AI can use inferences to provide a broader analysis of potential business partnerships and individual relationships.

The automation of basic analytical tasks can be done at scale by machines, which guarantees completeness and speed of analysis even with millions of data points and tens of thousands of documents in multiple languages. This helps reveal risks that human analysts might miss. But automated systems must be configured to reflect the firm's policy in terms of processes and type of information that should trigger a red flag.

The information and data harvested within the KYC/ AML process can be used to onboard a client and to inform a personalised proposition. The wealth management sector uses this where demand for a highly personalised service and an engaged relationship with an investment adviser is high. The AI enables the adviser to provide the client with what he or she needs in relation to their circumstances, giving them access to insights,

### Case Study
KYC/AML – InvestCloud

AI can help in three ways. Firstly, the ability to understand clients in terms of the compliance and reputational risk they might bring along. What is their exposure to things that are not desirable or acceptable? Has there been any adverse coverage? Are they close associates of unsavoury parties? Do they engage in sensitive activities in risky jurisdictions?

AI can also run a similar due diligence on the counterparties of a transaction to identify if the money transfer might be associated to nefarious activities.

And thirdly, by looking at payment patterns (amounts, frequency, destinations), AI can identify behaviours and flows that are suspicious or that do not align with the payment activities indicated by the client when opening the account.

causes, moral or ethical investment preferences and business or personal succession plans.

The importance of improving KYC/ AML cannot be underestimated, as money laundering is a massive financial drain on the global economy. Money laundering is estimated to be about 5% of global gross domestic product or $2 trillion annually.[13] Organisations also feel the pain through fines from regulators. In fact, 58 financial institutions paid almost twice the amount of fines globally in 2019 as they did in 2018, amounting to c.£6.2bn in penalties.[14] US regulators were most active, handing out 25 penalties totalling $2.29bn.The next largest is the UK, with 12 fines totalling £297.3m ($388.4m).

13  **Money Laundering**, *United Nations Office on Drugs and Crime*
14  **Global money laundering fines double as banks pay up £6.2 billion ($8.14 billion) in penalties**, *Bdaily News, Nick Till; 2020*

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## Robos and chatbots

Chatbots and Robos rely on the capability to decipher the information that the customer provides and thus provide suggestions that match risk and investment goals.

The intention is for AI to translate and make sense of what the customer is saying, although this currently draws more on what similar people are doing. But as AI capabilities grow, alongside the range of information used – structured, non-structured and holistic – AI will be able to translate what a customer needs, even when poorly expressed, to help to identify customer needs and risk profiles. In the future, an AI-enhanced Robo might be able calculate what a customer should invest in, for example, to be comfortable in retirement or bequeath a specific legacy to their families.

### Personal AI-Robos.
**David Birch,** Global Ambassador, **Consult Hyperion**

Instead of using a bank's Robo just for one thing, such as insurance, and another for something else, everyone could have their own personal Robo. The Robo would be able to learn from a vast range of information and data to carry out tasks such as choosing which insurance is most suitable, including deciphering the small print for example.

The Robo would need access to the full range of personal data that would be matched to a product using an algorithmic base so that the product choice was rational and guided by 'best fit' rather than by brand or other perception-based information.

Using the same concept, and if given access to the information required, an individual's own bot could sit in a call centre queue and log the initial request on your behalf, or set your personal financial health agenda. Given the volume of data input this would require, the individual would need oversight of the process and anti-bias measures would need to be applied here. The AI Robo would have an advocacy role, providing background information and translating things for the uninformed customer.

Using open banking, companies are already applying AI in banking apps to aggregate data and personalise customer offers.

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"

"The standard of AI when it comes to contextual information has to be high or else people will not use them. Retail banks can use data to provide insight on what a person might need based on their current account transactions or whether they have had a major life change. Done sensitively, this is a good thing to have."

**MARTIN RUNOW**
MANAGING DIRECTOR, GLOBAL HEAD OF PAYMENTS, FX AND DIGITAL
**BARCLAYS CORPORATE BANKING**
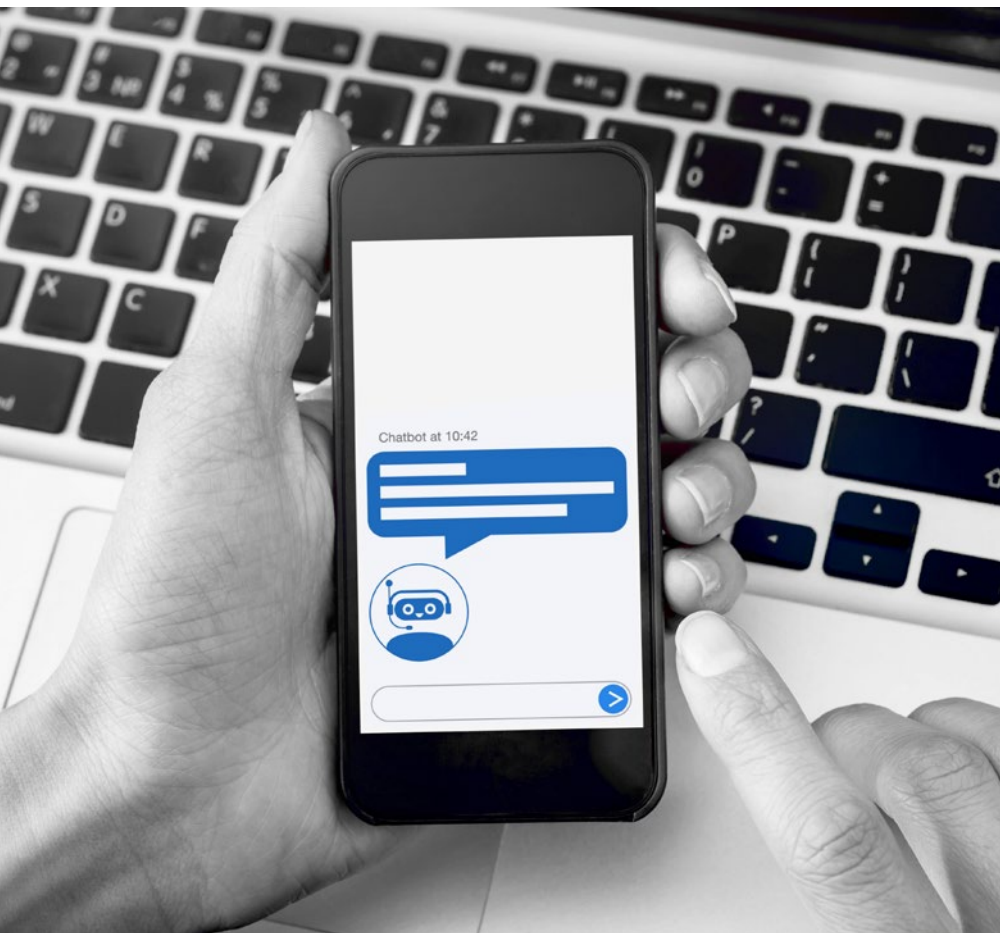
Chatbots meanwhile, have received a great deal of attention too. When they work well, they can provide a richer experience but when they don't, they are a huge source of customer frustration. Chatbots should not just recognise customer intent but also have a 360-degree customer view to contextualise that intent. Machine Learning can help to determine the best response using all the customer data and compare the intent and the data to situations it has come across in the past.

One of the best-known chatbots is Kasistio, introduced by DBS bank in 2017. It uses AI algorithms to create a human-like experience for customers requesting details on their accounts and transactions. The bank reduced its risk of human error and improved its response time through its ability to access the information far more quickly than a human.

Kasisto was a frontrunner and at the time the bot was lauded; many customers did not realise they were talking to a computer using NLP to communicate. It has since been widely replicated with other well-known iterations being RBC's 'Arbie'. It is described as a digital bank teller and can deal with money transfers, bill payments and bank statements. 'MIA', developed by BBVA subsidiary Garanti Bank in Turkey, uses NLP on mobile devices to allow its customers to transact.

The optimal use of chatbots to enhance the customer experience is in conjunction with a human – i.e. going through security with a chatbot to determine intent and then passing onto a human agent for anything requiring human judgement and intervention. It also reduces the bank's cost of employing staff to answer routine questions.

"

"Chatbots can break a conversation down into small blocks, some of which they can deal with, some of which they can't. Thus, human intervention is still a must. You also need the buy-in of the user to convince themselves that they are having a real conversation with a person who cares – not a machine."

**GERGO VARGA**
CONTENT MANAGER
**SEON**

## Blockchain

By using the a blockchain, AI can bring additional computing power to payments. Blockchain is, many claim, already an efficient way to store data, especially on the history of a payment transaction and both source and destination of funds. But AI can also use it to refine the decision process and provides actionable insights, like autonomous programming agents to receive and send money in a blockchain.

The combining of artificial intelligence and blockchain could introduce radical innovations in the future. According to the **International Data Corporation**, global expenses on AI increased to almost $57.6 billion by 2020[15]. Interestingly, around 51% of businesses leveraged the AI and blockchain combination. Existing

trends of applying AI in a blockchain would improve blockchain by introducing the following functionalities:

- Data protection
- Smart computing power
- Data monetisation
- Creation of diverse data sets

For example, AI embedded in 'smart contracts' executed on a blockchain can be used for re-orders, payments, or stock purchases based on set thresholds and events. AI can potentially resolve disputes and select the most sustainable routing method. It can also smooth the decision-making processes around loans and credit, drawing on applicant data from several sources that is already stored on a blockchain, thus negating the need to request it again.

> "
>
> Global expenses on AI increased to almost $57.6 billion by 2020.[15] Interestingly, around 51% of businesses leveraged the AI and blockchain combination.



A blockchain's ability to store data also helps the AI process. Because a central principle of blockchain is its transparency, it can help with tracing and auditing the decision-making process. Specifically, it can accurately document where data has come from, how it has been used and with which other data sets and variables, and trace how a decision has been made by an algorithm.

AI is thus not restricted to use cases that involve masses of hard structured data. It can also be used in a more contextual way to deal with inference and areas which require accessing several structured and unstructured data sets, which are more challenging for machine reading. AI enables that decision-making to be carried out in detail, quickly and in an auditable manner. ∎

15   **Artificial Intelligence and Blockchain,** *101 Blockchains, Gwyneth Iredale; June 2021*

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# Uptake, the future and potential barriers

## Uptake

Prior to the Covid-19 pandemic, interest in, and the uptake of, AI in payments was slow but steady. Now, financial institutions are looking at AI as a means to apply efficiency and cost savings to their operations. As the chart below shows, organisations that are considered 'frontrunners' by Deloitte put far greater value on AI adoption, with 25% considering it of critical strategic importance.

AI capabilities also support ongoing digitalisation efforts. As the adoption of digital channels by consumers grows, so does the need to communicate and service them quickly and effectively.

The **Bank of England's 2020 survey on the impact of Covid on machine learning and data science**.[16] It says that 50% of 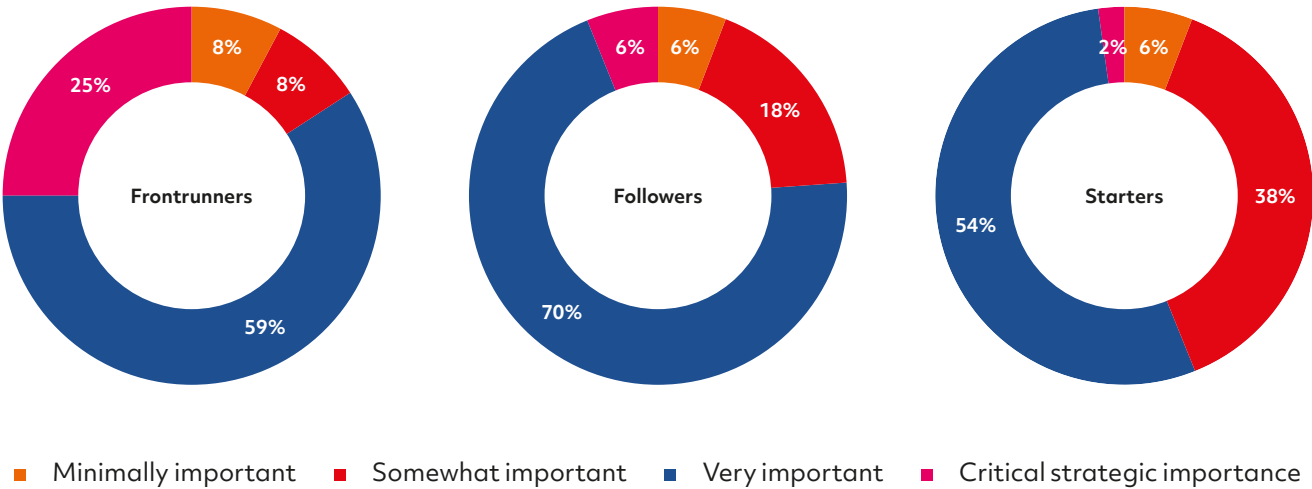respondents view ML as being important for future operations because of the pandemic. It shows a common application of ML by banks during this time to deal with increased customer enquiries and that ML resulted in increased operational efficiency for UK banks in processing a greater volume of government guaranteed loan applications.

Regulators are also responding to the increased use of AI and seeking to address the risks associated with the deployment of AI systems in the financial sector. These include risks to consumers' financial inclusion and stability. They also include risks relating to privacy, unlawful discrimination, unfair, deceptive or abusive acts or practices and the security and reliability of financial institutions. However, they are also starting to look at how AI might have a positive impact on their own function – notably by the extension of RegTech into SupTech. Understandably, this is in its infancy as it is inherently complex and the systemic risk of getting something wrong is considerable.

## AI adoption frontrunners better recognize strategic importance of AI adoption

**Frontrunners**
- 8% Minimally important
- 8% Somewhat important
- 59% Very important
- 25% Critical strategic importance

**Followers**
- 6% Minimally important
- 18% Somewhat important
- 70% Very important
- 6% Critical strategic importance

**Starters**
- 6% Minimally important
- 38% Somewhat important
- 54% Very important
- 2% Critical strategic importance

- Minimally important
- Somewhat important
- Very important
- Critical strategic importance

16  **The impact of Covid on machine learning and data science in UK banking: Quarterly Bulletin**, *Bank of England; 2020*
17  **Trends and policy frameworks for AI in finance**, *OECD Library; 2021*

The significant level of investment AI is currently enjoying from Venture Capital investors, gives some indication about the potential future uptake of AI. Figures from the OECD show that globally AI-oriented start-ups in 2020 in the financial and insurance industry, ranked seventh in terms of the amount of venture capital (VC) they attracted with total VC investment of over USD 4 billion worldwide concentrated in American AI start-ups.

Good examples of such investment include Stripe, which develops and provides financial infrastructure solutions so that companies can accept online payments. Stripe also offers fraud detection and prevention using ML.
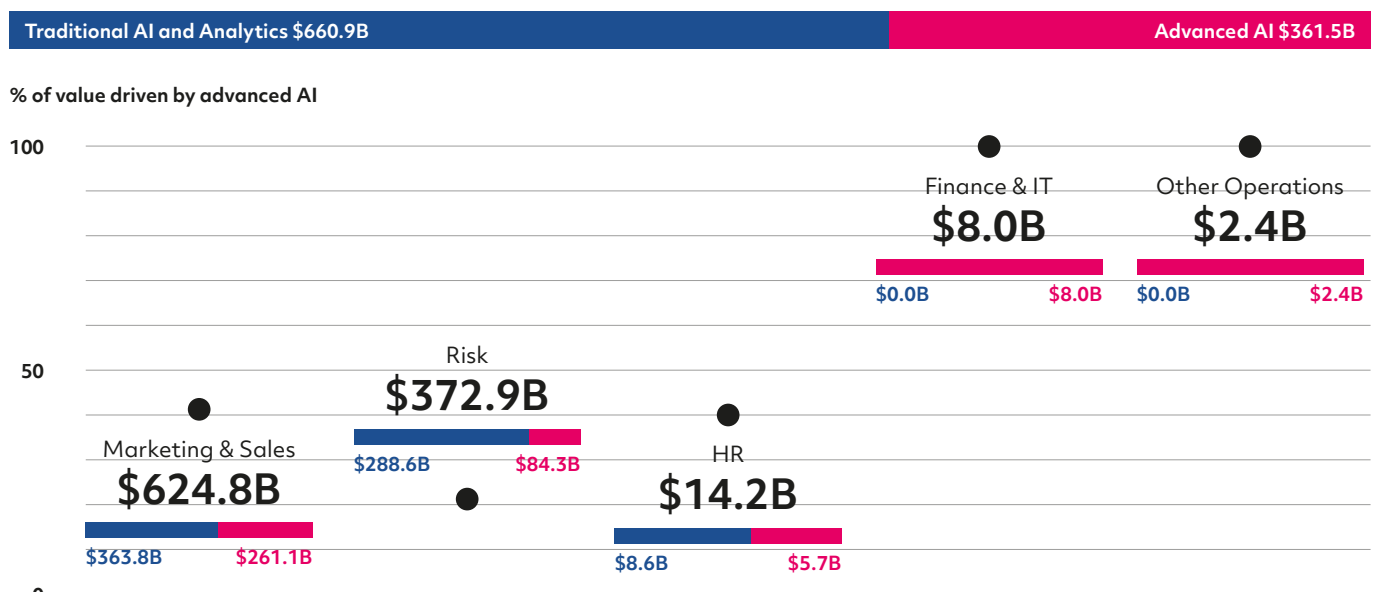
OakNorth UK, meanwhile, operates an AI-integrated platform that provides online banking solutions such as personal saving accounts, loans, and business credit financing services.

## Market size

According to a report by Mckinsey '**The executive's AI playbook**,' the potential total value of AI to the global banking industry could reach US$1tr (see below). The report says that, driven by advanced AI, the risk function could total US$372.9B or 50% of value, and that finance and IT could reach 100% of value driven by advanced AI.[18]



## Potential annual value of AI and analytics for global banking could reach as high as $1T

| Traditional AI and Analytics $660.9B | Advanced AI $361.5B |
|---|---|

**% of value driven by advanced AI**

| | | Finance & IT | Other Operations |
|---|---|---|---|
| 100 | | ● **$8.0B** | ● **$2.4B** |
| | | $0.0B — $8.0B | $0.0B — $2.4B |
| | Risk **$372.9B** | | |
| 50 | ● | | |
| | Marketing & Sales **$624.8B** $288.6B — $84.3B | HR **$14.2B** ● | |
| | ● $363.8B — $261.1B | $8.6B — $5.7B | |
| 0 | | | |

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## Critical success factors

The future for deployment of AI in payments looks promising. But being able to deliver that promise requires doing it well and maintaining confidence in AI throughout the value chain, including the end user. Defining the role of the AI and its scope is a critical starting point for this. Then the factors essential for success need to be adhered to, which include the following:

### Clean data
Since AI uses past experience to inform the future, it needs reliable, comprehensive and clean data to work with. The application of AI across different areas of analysis is heavily reliant on access to the right amount of relevant data – not having enough data is as unhelpful as having too much. The data needs to be integrated, pulled from various sources and then cleaned and structured for the AI to work on. Attention to detail is critical, with consideration of whether there is enough data, whether it is usable and what to do if not.

### Aggregated data
Once data is deemed sufficient and usable, this data needs to be aggregated. This is especially important when asking the AI to read, cleanse, draw together and interrogate multiple internal and external (seemingly unrelated) data sets in order to make predictions. Each data set needs to make sense on their own and together with other data sets.

### Effective AI supervision
As AI is constantly evolving, it requires constant supervision, vigorous testing and development to improve decision-making, such as how and why to avoid unconscious bias, data-sharing, privacy, security and being able to explain how it is being applied. If the process and the rules cannot be followed and explained, then decisions and actions become non-accountable and non-auditable. Thus, there needs to be a thorough methodology that is tracked and auditable for compliance purposes.

### AI accountability
The distinction between a 'black box' or a 'white box' set-up is important for accountability. There is a shift away from closed, 'black box' algorithms to 'white box' ML algorithms because black boxes are not fully replicable, and lack traceability, transparency, and opportunities to establish causal inference. A 'white box' algorithm encourages explainability and accountability and this matures and evolves as an AI function develops further, gains more data to analyse and can thus learn from its previous experiences.

According to Gartner, "increased trust, transparency, fairness and auditability of AI technologies continues to be of growing importance to a wide range of stakeholders". [19]

19 **Gartner Identifies Four Trends Driving Near-Term Artificial Intelligence Innovation** (*Press Release), Gartner; September 2021*

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> "What we have started with is AI being applied to distinct siloed processes. But useful synergies and precision can be obtained by linking different areas. For example, by linking KYC and AML you get a bigger picture and a larger data set with more inter-relationships and connectivity. This can help get a more complete understanding of the client's behaviour."

**ALESSANDRO TONCHIA**
HEAD OF STRATEGY, PRIVATE BANKING & WEALTH, **INVESTCLOUD**

> "

# There is a shortage of people with an interdisciplinary skillset in ML and computer science, data literacy, history, and mathematics.

Gartner's report also states that "responsible AI helps achieve fairness, even though biases are baked into the data; gain trust, although transparency and explainability methods are evolving; and ensure regulatory compliance, while grappling with AI's probabilistic nature."

The vital issue here is that the questions asked of an AI algorithm are juxtaposed against their long-term strategic goals: maintaining stability, enabling competition, and protecting consumers while ensuring a level playing field.

**Generative Adversarial Networks (GANs)**
Generative Adversarial Networks (GANs) are where networks are pitted against each other to improve themselves. They are typically unsupervised and use a cooperative 'zero-sum gain' framework to learn. They train themselves by generating new, synthetic instances of data that can pass for real data. They are mostly used in image generation, video generation and voice generation.

The potential for GANs is huge. They can learn to mimic any distribution of data and can recreate images, music, speech and prose. GANs, however, can also be harnessed to create fake news and Deepfakes, so caution should be used in their deployment.

**C-level support**
The biggest challenge when adopting AI in payments is tis often the human's role in the operation, not just in the form of the right skillset within the organisation, but providing C-level support to ensure that projects and implementations happen when in competition with other priorities for a company's attention and resource.

When C-level executives present the introduction of AI as a positive development, and an opportunity to upskill and reskill, this smooths cultural change and adoption of AI is rapid. If AI is understood as

a way to move people away from mundane tasks towards gaining the skills and capabilities to master the digital world and drive AI forward, then cultural buy-in is much more likely across a business as a whole.

**Building on current skillsets**
The application of AI within an organisation requires building on current skillsets. There is a shortage of people with an interdisciplinary skillset in ML and computer science, data literacy, history, and mathematics. The skills required to build AI accordingly are easy to overlook.

Alongside the horizontal application of AI, there needs to be a much less siloed approach to developing the right skills and experience to integrate the knowledge and experience of financial analysts, data engineers, data scientists, risk managers, internal auditors, and ML application developers.
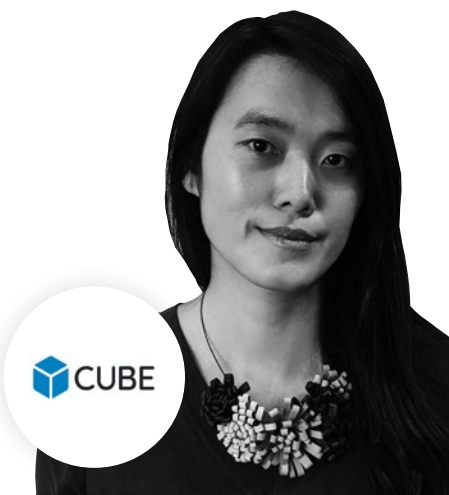
**Selective outsourcing**
Building sophisticated AI models in-house can be problematic from a scaling viewpoint as most firms simply do not have the computational power required to do AI at any great scale. AI-as-a-Service (AIaaS) has come to the fore as the best way to adopt AI in terms of both cost and efficiency. Capacity can be adjusted upwards or downwards according to need. And AIaaS makes it much easier to experiment and scale up AI capabilities once projects get off the ground and start to grow and become commercially attractive.

The Cloud makes intelligent capabilities accessible without requiring advanced skills in AI. AWS, Microsoft Azure, and Google Cloud Platform all provide options that don't require deep knowledge of AI or a team of data scientists.

**Collaboration**
Adopting a collaborative approach to AI and leveraging the cloud-based technical expertise and infrastructure – just as other non-core business areas are outsourced – will reduce barriers to AI. Then we will be able to have more AI applications prebuilt for specific use cases just as we do with Fintech solutions that can plug into a firm's tech stack using open APIs.

**Enabling regulation**
There have been reports of bias, discrimination, invasiveness to private data and violations of human rights, which has led the European Union to propose the **Artificial Intelligence Act**[20] which will aim to impose restrictions on AI in an effort to regulate the technology and eliminate these instances. While the law would

impact all industries, there would be a particular focus on high-impact sectors which includes both the banking and finance industries.

While these regulations seem to have the public's best interest and values in mind, it might be seen to propose an impractical solution, especially if other countries seek to implement them. According to the **Center for Data Innovation**, these new regulations would cost the European economy more than $30 million to introduce and manage.[21]

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"There needs to be talent within companies to ensure that the AI can be implemented, delivered, and evolved. Talent needs to be developed, deployed, and maintained. There is a massive skills gap in this regard…"

**YIN LU**
GLOBAL HEAD OF PRODUCT FOR REGBRAIN, **CUBE**

20  **Laying down harmonised rules on Artificial Intelligence (Artificial Intelligence Act) and amending Certain Union Legislative Acts**, *EUR-Lex, European Union; 2021*
21  **How Much Will the Artificial Intelligence Act Cost Europe?**, *Center for Data Innovation, Benjamin Mueller; September 2021*
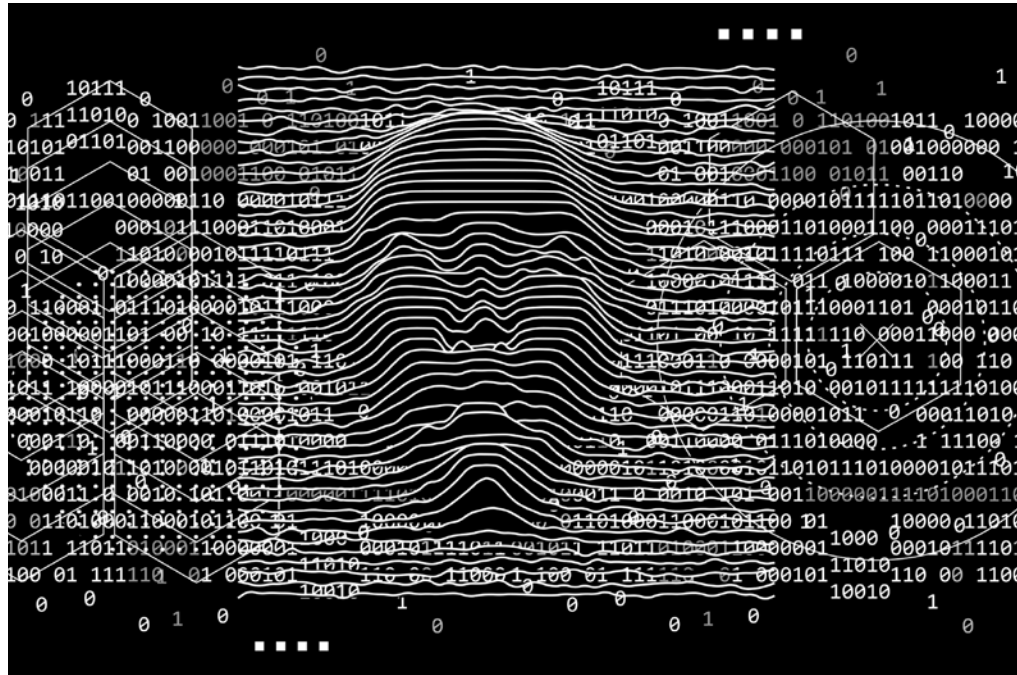
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## The future of AI in payments

AI will start to make a significant difference when it is applied across an entire organisation rather than just in specific silos or functions.

An obvious example of this is when using Robotic Process Automation (RPA), or Digital Workers, to automate a given process and to communicate across verticals. AI can be applied on top of this horizontal process management to produce a better overall outcome.

The core tech stack can be best used where Digital Workers are not AI-dependent but are used in conjunction with physical staff, with activities assigned to each according to their skills and capabilities. AI can be used to make sure that data and processes can connect and flow, while people fill the gaps and provide human oversight when tasks become complicated and require judgement. Digital workers sit in between the two.

Here, AI applies the brainwork over the muscle of the Digital Workers. It works intelligently, uses data and documentation to decide how to action something and instructs the RPA accordingly. This uses mainly ML but can also involve NLP, depending on what the AI is being asked to interpret and decide.

The AI then provides the translation and direction that the Digital Worker requires. The AI uses previous decisions to make a recommendation and the RPA is the orchestrator. ■

"AI tends to happen within distinct silos. This needs to change if banks are to make the most of the opportunities on offer. There is rarely an enterprise-wise team in place."

**BRIAN HALPIN**
VP, ADVISORY – CUSTOMER STRATEGY AND TRANSFORMATION
**BLUE PRISM**

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# Conclusions

**I**t is forecast that the overall market for AI will hit USD 360.36 billion by 2028[22] while delivering a CAGR of 33.6% between 2021 to 2028 from a base of USD 35.92 billion[23] in 2020 according to Fortune Business Insights.

Frontrunners have already recognised the strategic importance of AI and are driving holistic adoption of AI across the whole company. In most organisations, however, including many in payments, AI is currently being used like a sticking plaster on specific business pain points. However, there will be a tipping point when organisations in payments understand the value their competitors are extracting from using AI and don't want to get left behind. This will require the re-engineering of processes that were originally designed to have humans involved and to redesign them for machines. In this way, AI will eventually become a part of every major initiative, from customers and risk, to finance, workforce, and supply chain management.

Yet, payments companies must finely balance the benefits of adopting AI versus the cost of inaction. Standards and expectations of consumers have changed and unless companies adhere to the critical success factors highlighted in this report AI is an expensive distraction. Companies that embed AI into their DNA to drive innovation, customer centricity and operational efficiency will reap the rewards of lower costs, greater compliance, enhanced revenues, and more satisfied regulators. ■

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22  **Artificial Intelligence (AI) Market to Hit USD 360.36 Billion by 2028; Surging Innovation in Artificial Internet of Things (AIoT) to Augment Growth**, *Fortune Business Insights; September 2021*

23  *Ibid 6*

## About The Payments Association

The Payments Association (previously the Emerging Payments Association or EPA) is a community for all companies in payments, whatever their size, capability, location or regulatory status. Its purpose is to empower the most influential community in payments, where the connections, collaboration and learning shape an industry that works for all. It works closely with industry stakeholders such as the Bank of England, the FCA, HM Treasury, the PSR, Pay.UK, UK Finance and Innovate Finance.

Through its comprehensive programme of activities and with guidance from an independent Advisory Board of leading payments CEOs, The Payments Association facilitates the connections and builds the bridges that join the ecosystem together and make it stronger. These activities include a programme of monthly digital and face-to-face events including an annual conference, PAY360, the Emerging Payments Awards dinner, CEO round tables and training activities. The Payments Association also runs five stakeholder working project group covering financial inclusion, regulation, financial crime, cross-border payments and open banking. The volunteers in these groups represent the collective views of the industry and work together to ensure the big problems facing the industry are addressed effectively. The association also conducts original research which is made available to members and the authorities. These include monthly whitepapers, insightful interviews and tips from the industry's most successful CEOs.



The News Building,
3 London Bridge Street,
SE1 9SG, UK

**Tel:** +44 (0) 20 7378 9890

**Web: thepaymentsassociation.org**

**Email:** info@emergingpayments.org

@EPAssoc

The Payments Association