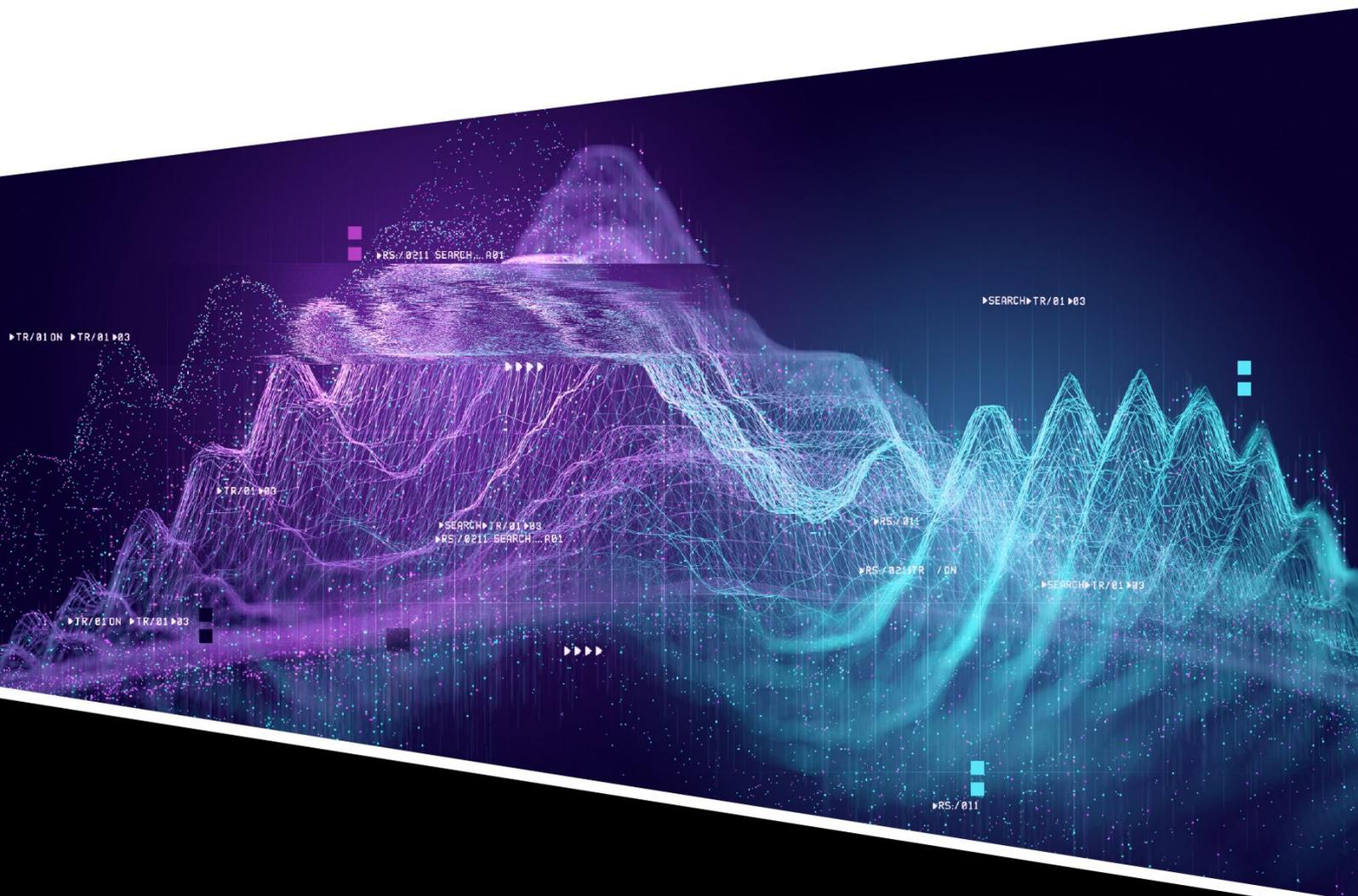


BANKING ON AI

Future-proofing financial services with AI analytics



SPARK  BEYOND



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EXECUTIVE SUMMARY

Today's volatile economic landscape, coupled with COVID-driven uncertainty, is putting traditional banking products and service lines under increased pressure. Fintech disruptors are eating into the customer base of established banks, and non-banks are entering the loan provision space.

Against a backdrop of higher demand and pressure on the banking workforce, it's critical for banks to ensure they can:

- **predict customer behaviour dynamically** (i.e day-by-day)
- gain **personalised insights into customer risk**

This will enable them to **adapt their products and services to individual customers**, in order to retain/augment their customer base and to increase wallet share.

Thriving in tomorrow's market requires incumbent banks to adopt AI technologies as the foundation for new value propositions and distinctive customer experiences.

Deploying such technologies at scale would enable servicing vulnerable customers with empathy, and targeting loyal customers effectively through cross-sell and up-sell of existing products.

It would lead to seamless, personalised customer journeys that improve NPS scores, while precise credit risk analysis, combined with cost efficiency, will cut operating costs and boost shareholder value.

Gains in market share will undoubtedly accrue when a **holistic transformation spans multiple layers of the organization, spearheaded by fast-response teams that harness AI** to map rapid shifts in customer behaviour, uncover default patterns, ensure regulation compliance, tackle fraud and tap into the opportunities offered by banking the unbanked (such as gig economy workers).

So where to begin?

In this whitepaper, we'll explore:

- the top initiatives banks can begin *now* in order to get started with AI analytics
- success stories from banks who are already leveraging AI
- the imperative in coordinating a focused AI investment with robust, reliable technology partners

Banks have long known the importance of business resiliency, but becoming resilient requires time and preparation, and the pandemic has forced many organizations to evolve at a pace few could have imagined.

Making the transition into the age of AI isn't easy, but it also isn't insurmountable. This whitepaper is an instrumental first step for your organization's journey in adopting AI analytics.

AI & Data Science: a brief overview

Before we dive straight into the discussion, let's clarify a few key terms and how they relate to each other.

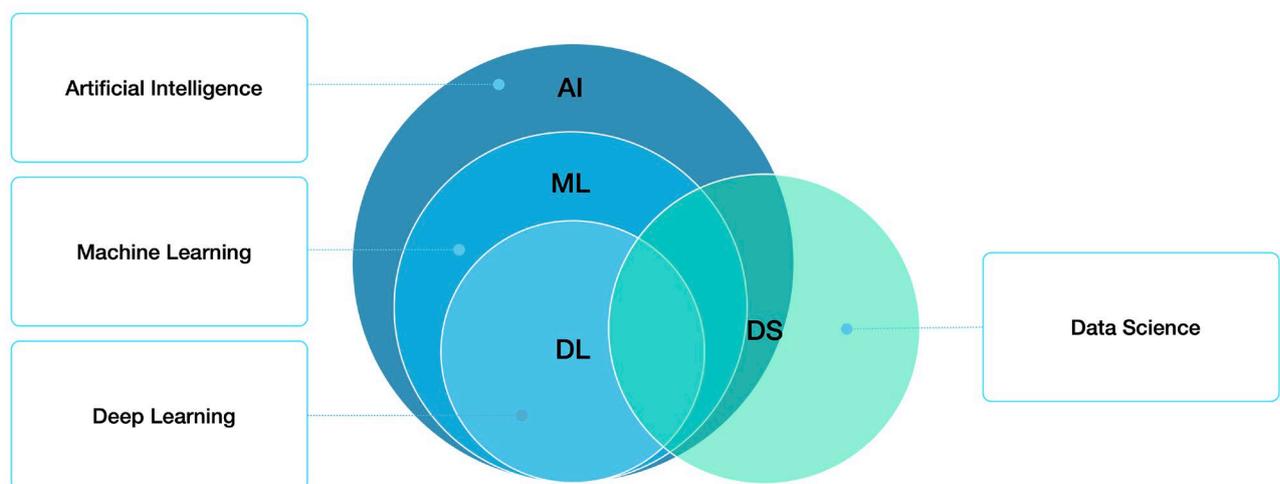
AI is often described as the ability of a machine to carry out the sort of cognitive functions that we associate with the human brain. These include perception, reason, problem solving and learning.

Creativity can also be an AI function. Examples of AI-enabled technology include self-driving vehicles, machine learning (e.g. an algorithm which learns the relationship between 'time of year' and 'interest rates' to predict house prices), robotics and virtual agents.

To date, most of the investment in global AI has focused on robotics (e.g. chatbots) and Natural Language Processing (NLP), whereby computers are used to process and analyse language (for example email filters or predictive text).

Investment is now moving into more creative applications of AI, such as data science.

SparkBeyond's Discovery™ Platform is one of the first platforms that applies AI-powered creativity, giving your team the ability to test millions of hypotheses per minute. This enables the discovery of previously unknown, unexplored patterns and insights behind complex banking problems.



The relationship between Data Science & AI



Glossary

Artificial intelligence is the ability of machines to simulate the human thought process (perception, reason, problem solving and learning). Creativity can also be an AI function. Examples include computer vision (self-driving vehicles), robotics, linguistics (eg chat bots – understanding tone and meaning in text) and machine learning.

Machine learning is the application of algorithms (maths formula) to data points to create models (graph representation). This enables the analysis of vast amounts of data to answer a specific question and predict future behaviour. ML decisions adapt, and improve their accuracy over time. Example: an algorithm which learns the relationship between 'time of year' and 'interest rates' to predict house prices.

Deep learning machines need a greater amount of data (but less pre-processing by humans) and generate highly accurate results. They use neural networks – like those in the human brain – and process data through increasingly complex layers. Example: health diagnostics using medical scans. However, deep learning machines **lack explainability** – i.e the drivers behind their model outputs lack transparency.

Data science utilises machine learning as a scientific method to discover the patterns and correlations behind problems, and use them to make data-based decisions. It comprises three core activities: data wrangling, statistics and machine learning (AI).



Why now is the best time to apply AI analytics

The volatility of the past year has impacted the banking landscape significantly. COVID-driven uncertainty is likely to trigger a rise in defaults among SME and retail customers, caused by redundancies, firm closures and a slackening off in furlough-relief. Meanwhile, challenger banks are entering the loan provision space and cutting into the traditional banking customer base.

Established banks are increasingly using AI to update their risk models, react at speed to unexpected shifts in customer behaviour, and increase wallet share.

Banks using AI recognise that:

Long-time-horizon historical data can't help them understand changes in the new normal.

30-80%

of conventional patterns are no longer relevant

Consumer behaviour has shifted (and continues to shift) rapidly. Models need to be iterated using a sliding 2-week timeframe of data.

Internal datasets are no longer sufficient.

40-70%

of relevant predictive signals come from external data sources.

Whilst transactional data can be mined more efficiently, banks need to leverage multiple external datasets to create a holistic picture of their customer base. Until recently, external data for credit risk scoring included National Census data.

Real-world insight:

A high percentage of postgraduates in a zip code will drive higher loan repayment.

As populations continue to live with the reality of COVID-19, and economic activity gains momentum, a broader range of external data – such as footfall, mobility, government restriction levels and geo-spatial elements – will offer up significant new drivers of retail and SME loan default.



We have over 300 machine-learning models powering decision support systems that were built over the last five years: now they need to be rebuilt, given this New Normal.”

Top-tier Retail Banking CDO, June 2020



The missing piece: augmented real-world data

Customer loyalty is critical, as is a resilient, evolving source of revenue (established and new product lines), and reduction of customer churn. Market share will be gained by banks which **take account of customer preferences**: financial institutions which **understand the customer**, tailor offerings accordingly, and offer a **low-friction, high-value experience**.

Every bank in the UK currently holds transactional data which can facilitate this understanding and enable them to tailor the customer journey.

This transactional data charts each customer’s financial status and offers a range of insights gained from their communications preferences and call/email outreach history.

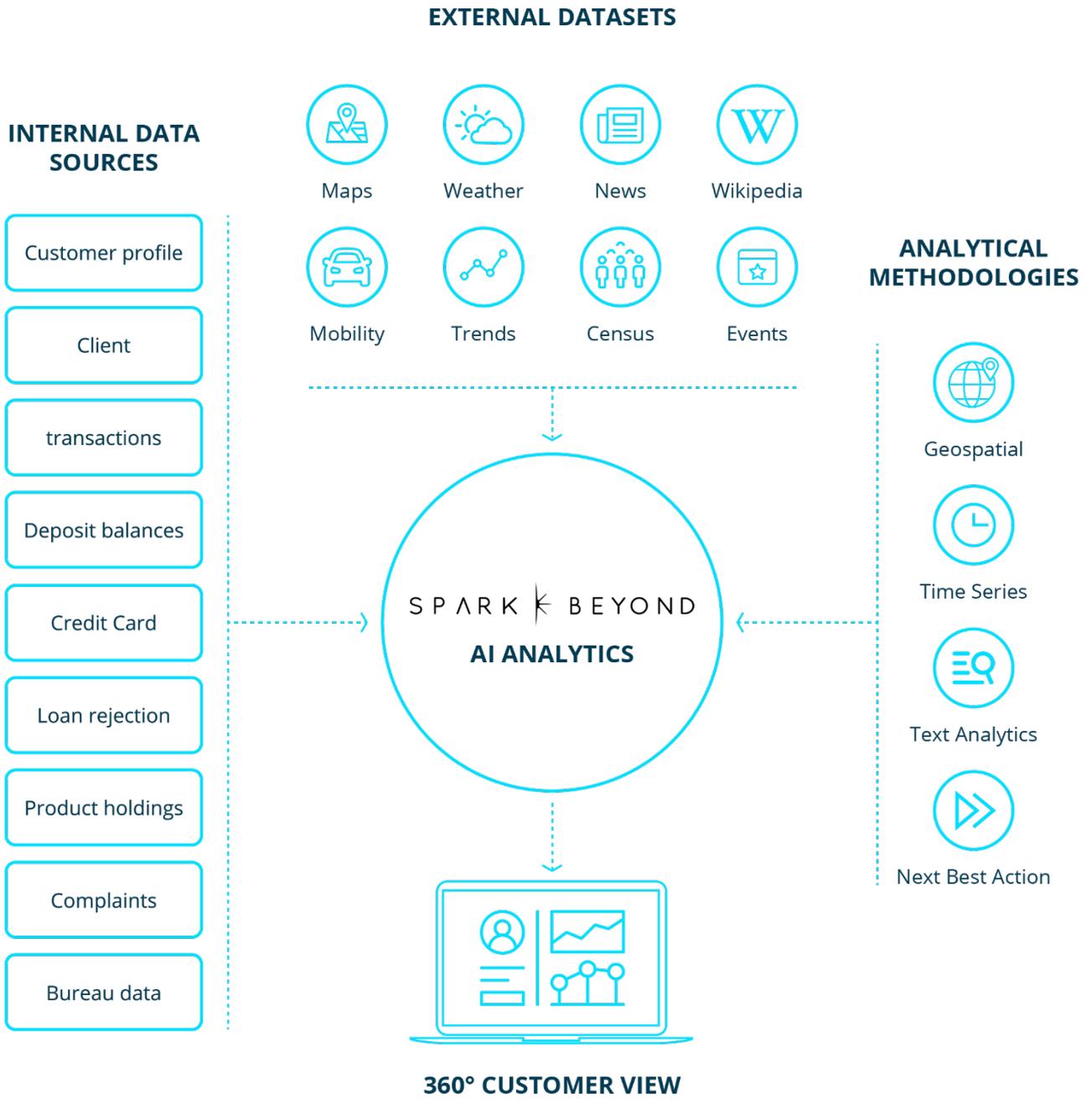
Transactional data can be used for a variety of scenarios: **identifying a vulnerable customer** to prevent default and prioritise, or pinpointing a **customer transitioning into retirement** (and thus needing a different level of banking support).

Today’s AI technologies augment these multiple internal datasets – such as client transactions, contact history, product information, data on redemptions and offers, app/website cookie data – with valuable, GDPR-compliant, real-world external data: footfall/mobility, geospatial (mapping), weather, demographic, census, trade and economic indicators.

This provides a holistic picture, right through to identifying and explaining the macro-economic pressures that are likely to affect customer behaviour.

Using this data allows banks to fully understand individual customer needs, and suggest tailored products or services using a holistic (rather than siloed) range of insights. It also ensures that the bank remains the primary, top-of-mind source of financial advice – to cement customer loyalty and prevent churn.

Leverage internal and external data sources





Automated data science flow

Today, it's a common misconception that data science is so advanced that it's fully automated. Most data science steps are still manual and involve handling messy data.

Some significant drawbacks to the traditional data science method are:

- Data teams require weeks to manually test for new patterns and insights, and then build predictive models around their findings. Not only has the world changed by that time, but these insights are limited by their own human intelligence.
- Manual models are rigid: they don't change over time, which means they don't adapt to shifts in customer behaviour.
- Human analysts can only find correlations in data which they think to test, preventing their organisation from discovering deeper, hidden insights they may not have thought to consider.
- Manually-sourced models (often called 'blackbox' models) lack transparency. This means they don't define or clarify the crucial behavioural insights which drive customer-trend predictions. This lack of explainability makes it impossible for business teams to exploit their valuable domain expertise by actioning data predictions. As a result, they lack the ability to add value to organisation-wide decision-making.

Advances in AI technologies have reduced time spent on data preparation by 35%, enabling data scientists to spend 50% more time on applying domain expertise to models and interpreting features.



Explainable insights for all stakeholders

In the past two decades, there's been a push to improve the performance of machine-learning. This has vastly increased the accuracy of machine learning predictions. Common applications of deep learning are image and voice recognition (eg Cortana). These deep learning models are blackbox models – meaning they offer high performance, but the 'inputs' driving their performance are super-technical and opaque. To simplify, **blackbox** generally means one of two things:

- that some of the insights upon which the model has been built are too complex for a human to understand
- that the insights are proprietary (and thus unavailable for inspection).

An example of the latter might be a model which uses the footfall of citizens to predict epidemiological transmission in a neighbourhood. This may raise privacy issues.

As a result, blackbox models generate predictions which must be taken on blind trust (because their insights – in effect, their building blocks – can't be investigated or interpreted). Today, efforts have shifted towards trying to explain blackbox models, but with little success because their inherent structure is profoundly complex.

By contrast, **glassbox** models enable the user to clearly define – and describe – the insights which support each prediction. In a glassbox model, the insights (building blocks to a prediction) are **explainable**, which means they can be fully investigated and shared, even with non-technical individuals. Without such explainability, business domain experts making decisions must trust the outputs of a 'blackbox' model blindly.

Glassbox models enable banking teams to use their domain expertise to fully grasp the complex patterns and correlations used to generate predictions and share them – even with non-technical teams. The result is **greater involvement** with business stakeholders and decision-making.



AI analytics' real impact on banking

Today's COVID-era 'new normal' is likely to see SME and retail customers continue to default on loans for unexpected – and previously unseen – reasons (economic and social). With this uncertainty forecast to continue well into the future, predicting these customer trends is a banking imperative.

Indeed, there's tangible – and profitable – early-entrant advantage to harnessing the power of AI to map these unexpected shifts, uncover patterns behind defaults, and identify vulnerable customers.

Amidst the uncertainty, advances in AI technologies are helping banks:

- boost revenues through **increased personalisation of services** to customers and employees
- **lower costs through efficiencies** generated by higher automation, reduced errors rates, and better resource utilisation
- **uncover new and previously unrealized opportunities** based on an improved ability to process and generate insights from vast troves of data

Real-time reactions

AI technologies enable banks to identify customer trends in minutes and hours (not weeks and months). It serves as a robust foundation for adaptive models, with constantly updated customer patterns and correlations built upon a source of rich, accurate data to leverage trends.

Analytics teams can use it to adjust models (e.g. through microsegmentation, additional risk rules or early warning signals). Accurate predictions can be made, for example, on defaults due to shifts in the labour market caused by redundancy, furlough reduction or industry-wide downsizing.

AI-automated credit risk scoring

Traditionally, retail bank credit risk scoring has relied on bureau and credit data, rather than fully leveraged transactional data – due to the technical difficulty of joining these often-siloed internal datasets.

Transactional data offers a partial behavioural picture of the customer when fully leveraged, and often fails to identify all external datasets (such as footfall, mobility, geo-spatial, census and demographic) that could provide a **holistic view of customer behaviour**.

Transactional data therefore tends to under-score propensity to default. It also takes time for data science teams to crunch transactional data, resulting in trend analysis, risk-scoring models and customer-default predictions which are **historical, rather than predictive**.

Unlike manual credit risk scoring, AI-automated scoring **automatically pulls together** a bank's *internal* datasets (domain expertise) and **combines** them with GDPR-compliant *external* dataset predictions such as footfall/mobility, geospatial (mapping), weather, demographic, psychographic, behavioural, weather, telematics and IoT, census, trade and economic indicators.

By combining declarative data with 360-degree customer view data, AI analytics allows credit teams to test and evaluate **millions of hypotheses per minute** (a time-consuming manual task when performed by data science teams). Teams can confirm or reject intuitive ideas, create new ones, and uncover unexpected patterns and correlations behind default and predict credit risk hotspots in the customer base.



Case Study: Predicting loan default based on application

AI analytics determined that if a loan applicant in the US uses the phrase 'I need' when completing forms, they are 1.5 x more likely to default; and the loan provider can adjust risk scoring accordingly.

If this applicant lives in a high socio-economic area, the likelihood could drop to 20% below the average (despite the phrasing).

(Data drawn from open-source 'LendingClub')

Analytics & business teams working as one

Data science teams often lack the domain expertise of their credit and customer team colleagues. This 'knowledge gap' results in missed opportunities for data analysts to explain/exploit the 'actionability' of the predictions they generate – especially when interpreting (and researching) data insights to drive impact against KPIs. (This is a frequent shortfall, even during data and AI pilots/projects).

Our experience shows that the greatest impact in corporate and retail banking comes about when the domain expertise held by customer/marketing teams is **combined** with the granular insights and behavioural/event predictions produced by data science.

Recent advances in data science and AI technologies mean the ability to code is no longer a requirement, making them accessible to the **non-technical** business stakeholder. As a result, a broad range of banking users can leverage data and AI to find automated solutions to complex business problems.

This 'democratisation' opens up the opportunity for banking teams to combine their domain expertise with the power of AI, resulting in a wealth of insights and predictions – all of which are explainable and actionable – to drive real KPI impact.

New segment opportunities: banking the unbanked

AI analytics empowers banks to identify accurate micro-segments (gig economy workers, students, entrepreneurs), quantify individual risk, and tailor offerings with deep personalisation for customers on the hunt for improved offers.

It also gives banks the chance to capitalise on the market share potential of the 'non-traditional customer/thin-file' (ie bank the unbanked).

Past efforts by global banks to accurately risk-model this underserved segment have failed. A top global bank recently spent 2 years (and approximately \$200 million) to no avail.

The advantages on offer to early-entrants in this field are vast.

Non-traditional customers include those with patchy credit history or those who don't pay their full salary into their bank account, plus 'thin-file' – entrepreneurs, people with multiple income streams and sole traders.

Similarly, SME customers – solopreneurs in particular – are another significant growth opportunity. With rapid, precision data on probability of default, loss given default, exposure at default and credit conversion factors, AI technologies enable retail banks to serve this new customer base by generating accurate risk assessments of previously un-lendable applicants.



Case Study: Greenfield opportunities with granular microsegments

*AI analytics A top European financial institution launched a **greenfield digital-first bank to acquire 500,000 new customers from an emerging segment of "solopreneurs"**. This was a complex, 'thin file' and unconventional segment of clients difficult to bank.*

*AI analytics connected six previously-siloed internal and external datasets to discover 50 million patterns **driving risk**. What's more, external datasets discovered additional hidden insights.*

In a matter of weeks, SparkBeyond successfully addressed this greenfield area of the business.

Novel insights driving cross-sell & up-sell

Until now, data science teams – operating manually – have struggled to leverage up-to-date insights at speed, and uncover the hidden patterns and correlations to impact cross-sell/upsell metrics.

AI automation **combines** multiple internal datasets – such as client transactions, contact history, product information, data on redemptions and offers, app/website cookie data – with external data including footfall/mobility, geospatial (mapping), weather, demographic, census, trade and economic indicators.

By evaluating millions of ideas per minute, it uncovers multi-layered and robust insights, **within hours**, which accurately forecast customer activity trends and customer life events that go beyond normal routine.

The result? Profitable, **moment-by-moment** cross-sell/up-sell opportunities (many of them previously unpredicted) that can be operationalised (i.e. acted upon) in one of two ways.

For example, elements of the predictive model can be turned into a dashboard that helps the marketing team view a clear graphic illustration of customer segmentations for targeting.

Or predictions can be turned into a product team playbook, to create innovative products for a newly found micro-segment of the customer base – thus boosting wallet share, cementing customer loyalty and reducing churn.



Case Study: Customer behaviour translated into actionable microsegments

One of Asia's major banks wanted to reduce loss in deposit balances by identifying high-risk customers, and offer tailored banking experiences on and offline. SparkBeyond quickly discovered thousands of predictive trends and niche customer segments addressable for deposit attrition, helping remove barriers and boost adoption.

The bank achieved a 30% higher deposit balance build (unlocking tens of millions of dollars) by combining its agile marketing with AI-powered granular insights derived from SparkBeyond.



How can banks future-proof with AI?

Today's banks don't need to start the journey to AI-orientation from scratch: they already have many of the pieces in place, including staff and business lines that are already using data to make decisions. Yet in order to drive impact – in roles and across teams – and take an early-entrant advantage from exponential advances in AI, we recommend leveraging data directly into the business unit.

At SparkBeyond and Microsoft, we see a growing number of cross-sector business leaders making early gains – new revenue streams for example – by combining their business unit's domain expertise with the precise, tailored insights gained from data and AI.

Here are some successful steps our customers have taken in their AI-adoption journey.

Build a strong core technology ecosystem

Deploying AI capabilities across any organisation requires a scalable, resilient, and adaptable set of core-technology components. A weak core-technology backbone, starved of the investments needed for modernization, can dramatically reduce the effectiveness of the decision-making and engagement layers.

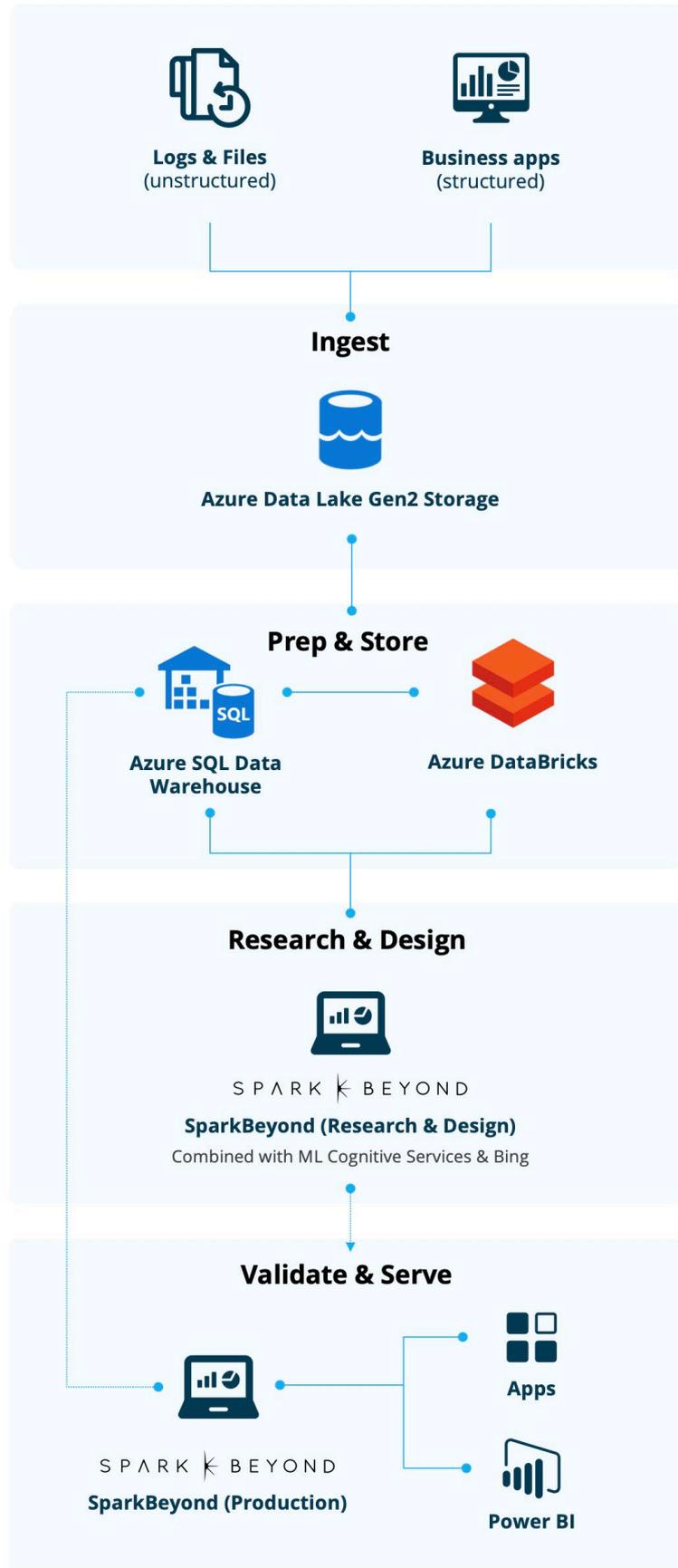
Built for stability, banks' core technology systems have performed well, particularly in supporting traditional payments and lending operations. Yet there are several weaknesses inherent to legacy systems.

Legacy systems often lack the capacity and flexibility required to support the variable computing requirements, data-processing needs, and real-time analysis that closed-loop AI applications require. Core systems are also difficult to change, and their maintenance requires significant resources.

The increasing use of cloud infrastructure and reduction of legacy technology leads to a bank's data liquidity—that is, the ability to access, ingest, and manipulate the data that serve as the foundation for all insights and decisions. Data liquidity increases with the removal of functional silos and allows multiple divisions to operate off the same data, with increased coordination.

To this extent, cloud-based platforms allow for the higher scalability and resilience crucial to an AI-oriented strategy. Microsoft Azure, for example, can help optimize data ingestion, processing, archiving and deletion. And in line with required regulatory compliance, Azure helps protect both bank and customer data with advanced security features, granular privacy controls, and a cloud optimized for compliance.

Azure SparkBeyond adds differentiation to the cloud scale analytics



Combine analytics with domain expertise

AI drives the greatest business impact when leveraged by CROs, CMOs, COOs, credit, marketing and analytics, and insights teams.

And when utilising SparkBeyond on Azure – with Power BI – **domain expertise is brought to the fore.**

The SparkBeyond Discovery™ Platform generates thousands of predictions (per hour) which are **fully accessible and explainable** – allowing teams to exercise their domain expertise and utilise results to their maximum potential.

In credit risk teams, for example, SparkBeyond on Azure allows them to:

- Generate a clear picture of risk, with a recommended up-to-date flow of actions that reduce risk, exposure and rates/probability of default.
- Generate an understanding of the pressures associated with different market verticals' *new normal*. For example: where the major risks lie, and which sectors are likely to bounce back quickly.

SparkBeyond helps banks paint a much more detailed picture of risk, by being able to drill deep into the transactional data they already hold – overcoming the often-quoted 'hard to mine' nature of this data.

Strengthen the data backbone

AI Many banks' data reserves are fragmented across multiple silos (separate business and technology teams), and analytics efforts are focused narrowly on stand-alone use cases.

Delivering personalized messages and decisions to millions of users and thousands of employees, across the full spectrum of engagement channels, requires banks to shift from attempting to develop specific use cases and point solutions to an enterprise-wide road map for deploying AI analytics and models across entire business domains.

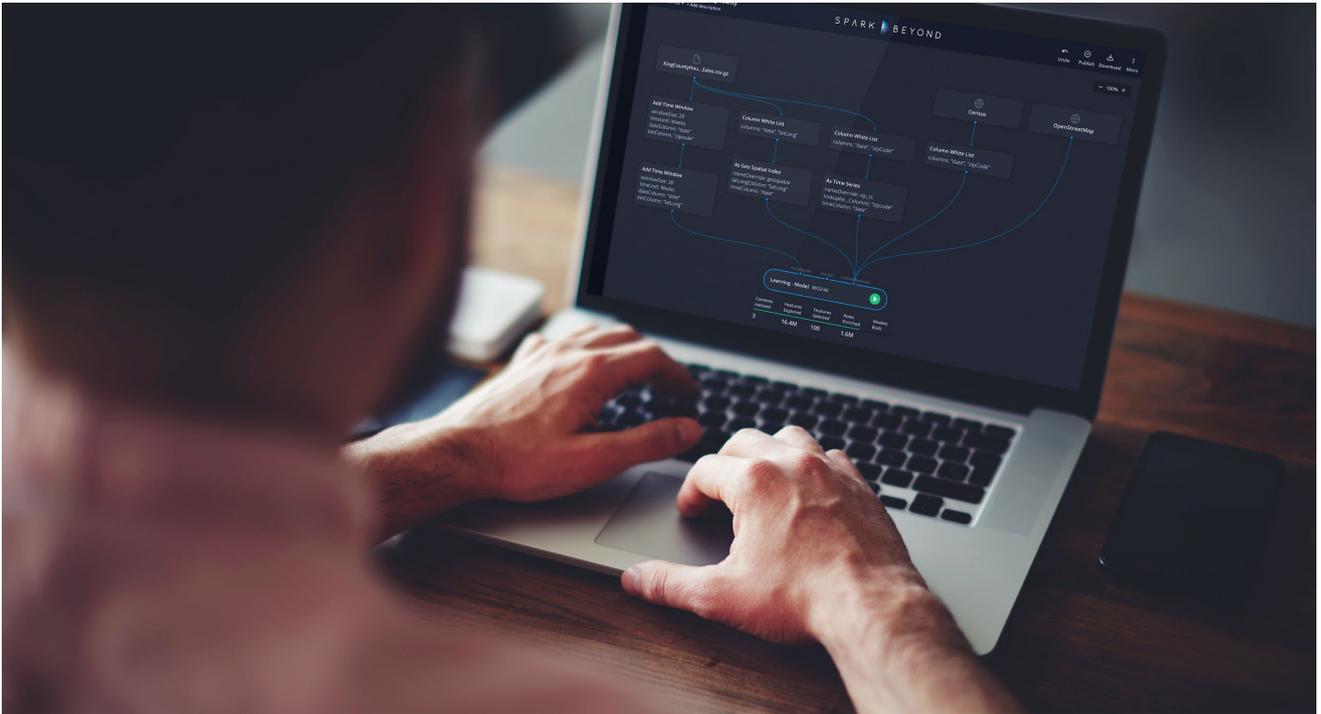
Without a centralized data backbone, it is practically impossible to analyze the relevant data and generate an intelligent recommendation or offer at the right moment. If data constitutes the bank's fundamental raw material, the data must be governed and made available securely in a manner that enables analysis of data from internal and external sources at scale for millions of customers, in (near) real time, at the "point of decision" across the organisation.

Data trust, transparency, interpretability, and responsibility matter: while regulations are a unique challenge for banks, the ways in which personal data can be obtained and used will continue to become more limited in today's strengthening regulatory environment.

In this environment, AI analytics' 'glassbox' models and explainable insights are ideal. Aligned with a well-defined data governance strategy, analysts can augment internal client data with external inputs to identify detailed and complex behaviors in an explainable manner.

For many banks, adopting AI analytics across the enterprise is no longer a choice, but a strategic imperative. Envisioning and building the bank's capabilities team-by-team ensures success in scaling AI technologies across their organization.

It's difficult, but not insurmountable. To achieve the speed, agility, and flexibility innate to a fintech, while managing the scale, security standards, and regulatory requirements of a traditional financial-services enterprise requires close coordination with robust, reliable technology partners. Working closely with multiple parties – cloud partners, IT, security, analytics providers – banks are working hard to achieve a world-class and secure solution at scale and on cloud, today.



The SparkBeyond-Microsoft partnership

Microsoft leverages a wide partner ecosystem to help solve customers' key challenges. Microsoft and SparkBeyond jointly leverage their expertise in operationalising technology, which means every customer solution starts with a sharp focus on strategic impact driven by tangible use cases & KPIs.

Our teams understand the importance of human connection, and our comfortable, well-embedded partner dynamic puts it right at the heart of every customer conversation; starting with the challenge first.

SparkBeyond-Microsoft: our belief in the power of AI – to transform economies, societies and lives – takes data-driven impact beyond the theoretical and makes it a reality.



SparkBeyond is a top Data & AI partner globally and an exciting software used by numerous Fortune 500. What they can do to convert data into intelligence for our customers is truly stunning...."

Gaviella Schuster, Chief Vice President, Microsoft

The Authors



Janet Jones

Head of Industry Strategy,
Financial Services, Microsoft UK



William Maunder-Taylor

Growth Lead,
EMEA, SparkBeyond



Rick Allman

AI Impact Strategy,
Financial Services, SparkBeyond

About SparkBeyond

SparkBeyond is on a mission to deepen and accelerate the human ability to solve complex problems on a global scale, combining breakthrough technology with human excellence in order to make better sense of operational, financial and social realities.

Global industry leaders and top consulting firms leverage SparkBeyond's technology to extract novel insights out of data, develop new knowledge, and orchestrate solutions for their most pressing problems, driving lasting impact across a broad range of challenges.

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