The Role of Risk Management in Supporting the Adoption
of Artificial Intelligence in Financial Services

Isaac Alfon,
Managing Director
isaac.alfon@crescendo-erm.com

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Abstract

Artificial Intelligence (AI) is changing financial services. This also represents a challenge to governance that extends to how risk management is applied. This paper suggests a perspective of risk management as a business enabler to create the necessary infrastructure to ensure that AI tools achieve their transformational potential. This includes articulating a vision of how a control framework should be leveraged, considering the impact on risk management frameworks, focusing on explainable AI, and target operating model.
1. Introduction

FinTech is one of the current developments challenging and changing financial services. It includes an even larger reliance on computer models, e.g. artificial intelligence (AI), to achieve business objectives and deliver consumer outcomes. This is the result of a number of underlying developments:

- greater computer power enabling faster processing of data, which may not be necessarily structured in the traditional sense;
- the ability of computers and users to interact and at the same time generate and record data in ways unknown until recently;
- consumers’ ever rising expectations of automated servicing and personalisation.

These developments have led to innovation and disruption in financial services. Often, these developments are underpinned by artificial intelligence (AI).\(^1\) This involves learning about a problem from significant amounts of data (e.g. credit rating), using the data to forecast for a new case (e.g. a new applicant for a mortgage) and a degree of autonomy to act based on the forecast (e.g. accept an application).

The traditional modus operandi of technology is sometimes associated with the motto “move fast and break things” from Facebook’s early days.\(^2\) This approach does not work in financial services where people’s money is at stake and there are regulatory expectations about the fair treatment of customers.

This paper explores the role that risk management can play in supporting a sustainable use of AI tools in this environment.

In doing so, I explore the role of risk management as something other than the stereotype of a ‘blocker’ of change in the business or ‘corporate antibody’. I also wish to focus on incumbents rather than start-ups. The disruption associated with start-ups and innovative business models in financial services is also spurring the transformation of incumbent players. For example, the largest digital bank in the UK is also one of the oldest – Lloyds Banking Group has 9 million active smartphone customers.\(^3\)

The rationale for this perspective is the view that real change across financial services will take place when incumbents become truly digital. This rationale can also be inferred from the FCA’s support for Fintech, which includes allowing incumbents to participate in the FCA sandbox where ideas are exposed to customers in a controlled manner.\(^4\)

It is worth considering at this point, how much progress AI has made in financial services. There is a lot happening in this space and it is worth taking a step back and considering how much is hype and how much is real change. For that I turn to the Bank of England; as was noted in a recent speech:\(^5\)

“… the situation seems rather less revolutionary and more evolutionary. No hard data on industry-wide uptake are available but intelligence from supervisors is that the scale of adoption of advanced analytics across the industry so far is relatively slow. There is

\(^{1}\) Other forms of innovation and disruption are driven by other technologies (e.g. blockchain), innovative business models and the identification of demands that have not been met by traditional providers.

\(^{2}\) MashableUK (2014).

\(^{3}\) Business Insider (2018).

\(^{4}\) Though the sandbox is more popular with start-up companies and those that are not yet authorised, FCA (2017).

\(^{5}\) Proudman (2018).
clearly however the potential for the usage to accelerate.”

This statement was made in the context of banking and I suspect that the situation is likely to be similar in insurance. In any case, the difference between revolution and evolution mentioned is speed. The Bank of England is not alone in this cautious judgement. For example, an article in the MIT Technology Review observed:6

“We are surrounded by hysteria about the future of artificial intelligence and robotics—hysteria about how powerful they will become, how quickly, and what they will do to jobs.”

There seems to be little disagreement as to whether change will happen, and the difference is the pace of change to achieve the transformation.

The paper shows how a risk management perspective can support the wider adoption of AI in financial services. It is structured as follows:

- the potential changes in risk profile from using AI (section 2)
- an alternative perspective on the current state of AI (section 3);
- the alignment with risk management (section 4)
- the importance of the tone from the top (section 5);
- key aspects of a risk management framework that should be considered (section 6); and
- the impact on the business model and target operating model (section 7).

2. Changing Risk Profile

Standard computer algorithms which are not AI-based can—and do—solve complex problems. Their main feature is that the algorithms produce the same answer as long as the same inputs are provided. So, a credit-scoring mechanism calibrated to capture a certain type of client gives you just that.

The answers offered by an AI-based system may change over time. New data is used to reassess the underlying relationships and recalibrate the relationship between the target variable and the potential explanatory variables. This ‘learning’ can also happen in a standard programme when there is a process of recalibration. The difference is that in the case of AI, this learning happens in real time; that is the essence of AI.

Alternatively, a target variable may not have been defined as part of the AI tool. That is not as unusual as it might sound. For example, algorithms assessing a loan or credit card underwriting may fall in this category because there is no single rule to predict a borrower’s likelihood of repayment. New data can lead to a certain recalibration or can be used to identify new relationships between data available. For example, over time an AI-based system might identify that outstanding debt is a better predictor of the likelihood of borrower repayment than repayment history and penalise someone with a relatively good track record of timely repayments.

The first type of AI-based solution is called ‘supervised machine learning’ and the second one is ‘unsupervised machine learning’. The key difference is the extent of autonomy that goes with the learning.

Consider the potential impact on conduct risk of AI-based tools. One of the expectations from Treating Customers Fairly (TCF) with respect to product governance is that they are designed to meet the needs of identified consumer groups and are targeted accordingly. This requires a clear business strategy, including identification of the target market through a combination of qualitative and quantitative research and oversight of the business to ensure that it is aligned with initial expectations of customers and business. Take the example of automated

6 Brooks (2017).
investment services covered in a recent FCA review.\(^7\) These providers would rely on some type of AI-based solution, whether supervised or unsupervised machine learning. The possibility of capturing different types of customers or generating advice different from what was envisaged cannot be ruled out. The challenge is how to put in place a monitoring approach which ensures that outcomes and risks which arise are consistent with the expectations in the business plan.

Something similar can apply from the perspective of credit risk, impacting the quality of the portfolio and performance. Suppose you have been targeting retail customers with a specific risk rating for a credit card business. If you roll out an AI-based solution to enhance the efficiency of product underwriting, you would need to have in place mechanisms to ensure that the credit quality of the portfolio is consistent with your expectations—or else change those expectations. Both options are fine. You may want to keep your target credit rating constant and seek more volume, or perhaps you see AI-based solutions as a more robust tool to support decision making and, in a controlled manner, can relax your target rating. Regardless of your choice, you would need to put in place a credit risk monitoring approach that is suited to the new AI-based solutions, as well as ensure that the business understands the portfolio implications of ‘learning’ that is at the core of an AI-based solution system.

3. Experience of Transformational Technologies

Overall the current position of AI in finance can be summarised as one where the technology is available but not yet fully utilised. Sometimes it takes time for innovations to have an impact because people do not immediately change the mind-set associated with the previous technology.

This can be compared with the progress in adopting another transformative general-purpose technology: electric power.\(^8\) Following the invention of the light bulb in the late 1870s, Edison built electric power stations in 1881 in the US, and within a year electricity was available as a commodity. Yet as late as 1910, when electric motors had more to offer, manufacturing still relied on steam power.

Steam-powered factories were arranged in a specific form to benefit from the single steam engine through a central drive shaft that ran through the factory. Initially, owners changed the source of power to electricity but to fully benefit from it, factories had to be rearranged according to a different logic. In addition, rearranging factories gave workers more autonomy and flexibility, and the way staff was recruited, trained and paid had to change as well. As a result, adopting electricity meant much more than simply substituting one source of power for another and the pace of adopting electricity was slow.

I believe this analogy is also relevant to incumbents’ application of AI in financial services. It offers a new way of powering decision making in businesses. The example of replacing steam power with electricity suggests that to get its full value, financial services incumbents must think about AI as more than a replacement for existing tools. AI opens new possibilities, like electricity did.

4. Alignment with Risk Management

I do not claim that risk management is the key to the transformation that would integrate FinTech and AI into financial services, but I do claim that, properly considered, risk management can help significantly.

There are differing views about the aim of risk management in financial services. If you view risk management as a quantitative discipline or as an extension of compliance, the claim that risk

\(^7\) FCA (2018).

\(^8\) Harford (2017).
management can support the adoption of AI may come as a surprise.

If on the other hand, you take the view that the aim of risk management in financial services is ‘protect and enable’, then this claim may not surprise you. This view combines the protection of the business’ franchise value and supporting the risk-taking activities to increase franchise value. The latter is more challenging and requires a broader business perspective. The table below offers some examples of activities associated with each aspect.

Table 1: Examples of Protect and Enable

<table>
<thead>
<tr>
<th>Protect/Enable</th>
<th>Traditional Risk Management</th>
<th>FinTech</th>
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<tbody>
<tr>
<td>Protect</td>
<td>Rules based approach to comply with anti-money laundering requirements</td>
<td>Managing cyber risk exposures</td>
</tr>
<tr>
<td>Enable</td>
<td>Using economic risk capital in decision making</td>
<td>Using AI tools to support business decisions</td>
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An alternative perspective to consider is that FinTech’s modus operandi is different from the current systems perspective with typically shorter development cycles and scale. For example, in 2016 Google had more than 1000 ongoing AI projects. This may not be representative for financial services. However, even if you accept that the scale of AI projects in financial services may be different, there is still a challenge in terms of applying effective controls to this activity in the regulated environment of financial services.

I am also conscious that risk management is experiencing a push-and-pull effect as a result of FinTech. I am describing here risk management’s push effect on the business. At the same time, there is also a pull effect for risk functions; they also need to adapt to these technological developments and much of the content of this paper would be relevant, in particular the need for a vision.11

5. ‘Tone from the Top’

The board should provide clear messages about how it expects a control framework to evolve for AI and perhaps new technologies more widely. This is usually referred to as the ‘tone from the top’ and would set in motion the appropriate activities.

Articulating the tone from the top is likely to be an iterative process, like any strategy formulation process. There might be also a process of familiarising the board with AI to ensure that there is a shared understanding. As a practical matter, it may be useful to start these discussions outside the calendar of board meetings.

There are a number of issues that I would expect to be clarified as part of the tone from the top but perhaps the key ones include the following:

- wider consideration of technology – there would be a fair amount of technology available which would not necessarily be AI-based and can be applied to improve existing business processes and reflect a customer-centric perspective which should not be ignored for the sake of AI technology;
- accountability – the Executive Committee should put in place arrangements to approve and oversee the development, introduction

9 The difference between traditional and Fintech approach to ‘protect’ is not fixed. Developments in technology also apply to regulatory compliance (RegTech) which is shifting compliance with regulatory requirements from the traditional approach to FinTech. For example, it is possible to develop models that can identify outlier transactions and meet the expectations of anti-money laundering requirements.

10 The Week (2016).

11 See also McKinsey and IIF (2017) for a review of the challenge for risk functions.
and business use of AI and to provide the board with regular progress reports;
• clear purpose and link to business strategy – broadly speaking AI can be deployed to seek efficiencies (e.g. claims management) or to enhance business opportunities (e.g. underwriting) or both;
• considering the implications for risk management framework and governance, see next sections.

In terms of the process, it is also important to recognise that these issues are complex. The appropriate business response may not be a point-in-time consideration but rather monitoring the performance of the various AI projects.

There are two additional aspects needed to shape an appropriate tone from the top, which are beyond the scope of this paper. Firstly, someone with an appropriate business development and technical background should lead at the executive level. Secondly, a strategy for communicating the ‘tone from the top’ to middle management and the wider staff is crucial to ensure that the message become part of the business culture.

6. Implications for Risk Management and Governance Frameworks

Insurers have developed and implemented risk management frameworks that meet business needs and support the governance expectations of boards and regulators. These frameworks allow financial services business to react to external and internal developments. The novelty of AI means that there is a risk of acting on an inappropriate assessment. The frameworks are unlikely to need an overhaul to integrate AI tools, though they would need to be explicitly considered in the context of any Pillar 2 assessment. However, several specific issues for AI tools would also need to be considered from the perspective of the framework to ensure that the specific aspects of the development and operations of AI tools are covered adequately. These are summarised below.

Roles and Responsibilities

The ownership of each AI tool in terms of development and operations should be clarified to ensure there is business buy-in. In particular, ownership should be with the relevant business team (e.g. claims management) rather than a development team. Roles and responsibilities should be defined accordingly, covering the end-to-end process from development to operation.

The consideration of the business purpose of AI tools mentioned earlier (efficiencies vs. growing the business) is not only a matter of business strategy to be considered at a macro level. This consideration should also take place for every AI solution to inform the control environment. Where the solution under consideration will be shaping business decisions affecting customers (e.g. underwriting), it is important to articulate how this would affect customers and what measures would be put in place to ensure fair outcomes. At this point, it is important to recognise that not all AI systems interacting with customers have the same importance. Think of the difference between AI tools behind Netflix film recommendations and those behind a mortgage underwriting decision.

Conduct

Complying with conduct requirements and relevant legislation is another aspect of the risk management framework. There may be specific regulatory requirements associated with the specific business area. For example, an AI tool that provides financial advice (‘robo advice’) will need to meet the relevant requirements for conduct requirements and ensure it operates in

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12 For insurers, this is set out in Article 45 of the Solvency 2 directive.
In addition, there are two main sets of regulatory requirements that are vital for developing AI tools. Firstly, AI tools extensive use of data has the potential of falling short of requirements for avoiding discrimination. The UK’s Equality Act from 2010 protects people from discrimination by reference to age, disability and other ‘protected characteristics’.14 AI might also give rise to the risk of indirect discrimination. This takes place if there is a policy that applies in the same way to everybody but disadvantages a group of people who share one of the protected characteristic in the legislation without an objective justification.15 This could be addressed through a comprehensive testing of the AI tools and comparison against benchmarks.

Data privacy legislation is also relevant to development of AI tools – EU’s General Data Privacy Regulation (GDPR). Firstly, data sets available to train the model may include personal data, which should be removed to facilitate handling. For example, a data set of insurance claims could be stripped of names, addresses and other identifying features. There is an ongoing debate about the extent to which anonymisation can truly take place though the Information Commissioner believes that it is feasible.16

Secondly, the GDPR includes a requirement about the so-called ‘right of explanation’ (article 22)

Financial services businesses considering AI tools should explore how to provide clear explanations to customers. These should cover the process for decision making and how individual decisions might be explained. There is an emerging consensus that it is technically feasible to extract the kinds of explanations that are currently required of humans from AI systems – for example whether and how certain input factors affected a decision or outcome.18 This is referred to as ‘explainable’ AI and it can be achieved without revealing commercially sensitive information.

‘Explainable’ AI is part of the process of developing AI tools rather than a communication or disclosure issue to be addressed after the model has been developed. This process would also contribute to the business’ understanding of the tool so that it represents less of a black box and can provide actionable insights to management. For example, if you are looking at customers’ persistency it is also important to

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14 ‘Protected characteristics’ are age, disability, gender reassignment, marriage and civil partnership, pregnancy and maternity, race, religion or belief, sex, sexual orientation.

15 There is similar EU legislation in respect of sex discrimination in insurance contracts that prohibits discrimination, i.e. the use of gender as a risk-rating factor. The use of risk factors which might be correlated with gender therefore remains possible, as long as they are true risk factors in their own right, EC (2012).

16 Paragraph 72 in HoL (2018).

17 FCA Principle 2 and PRA’s Fundamental Rule 2.

18 Doshi-Velez et al. (2017).
understand the factors driving persistency as this would be the basis on which actions may be taken.

Model Governance

Insurers and banks have successfully implemented the required control frameworks to gain regulatory approval of their internal models assessing risks and calculating regulatory capital. These regulatory requirements would not apply to AI tools supporting business activities such as claims management and underwriting.

The discipline of documenting the model including the statistical theory behind it, expert judgements and weaknesses and limitations, are equally relevant to AI tools. Perhaps the main difference is that documenting AI will make it even more important that the rationale for the approaches adopted rather than the technical details are articulated to engage effectively with senior management. Something similar would apply to the oversight of AI tools and the need to undertake a comprehensive range of scenarios that evidence the performance of AI tools for individual cases.

Another important aspect of model governance is the control of changes to the model once it has been baselined. It is important that appropriate procedures are in place to ensure that changes to AI tools and their implications are understood and subject to the appropriate oversight.

Outsourcing

The development of AI tools might require partnering with third parties to acquire or complement relevant technical skills and data. These contracts should be subject to the usual controls and due diligence undertaken when commercial relationships with third parties are established. For insurers, they may fall under the regulatory category of material outsourcing that needs to be reported to the supervisor.19

Data Governance

The performance of AI tools is driven by the amount and quality of the data — the quality of a model’s prediction is only as good as the data used. This includes the governance of data quality, the processes of data collection and the appropriate separation of data to calibrate the model as well as testing it to validate the results in terms of accuracy and treating customers fairly.

The key risks are the assessment of the provenance of any external data acquired and the additional business exposure to cyber risk from importing the data. These risks should be assessed at the outset to avoid surprises while the AI tool is in development.

7. Impact on Business Model

The development of AI tools can result in changes to the business model and how financial services firms compete in the market place. For example, AI tools might open alternative revenue mechanisms that have not been used so far which can create an additional challenge of how to comply with regulatory requirements or create new competitive pressures. Perhaps the largest challenge is that the change in the business model becomes the cumulative impact of the deployment of many AI tools. Boards should be aware of this possibility and keep this under review.

On a micro-perspective, the development of AI tools requires an adequate consideration of integration into the business operating model. There is a general consideration of how the AI tool would interact with other business stakeholders, e.g. links with financial systems making and receiving payments from customers and storing their transaction history. From a risk management perspective, the key consideration is

19 Article 49 of the Solvency 2 directive.
the role of human intervention or control in the day-to-day operation of the AI tool. There is a continuum of approaches. The range includes, at one end, the AI tool operating independently with no human intervention, perhaps including the possibility of a business over-ride to stop the system. For example, the PRA has required this feature for algorithmic trading systems.\textsuperscript{20} At the other end, the AI system provides a forecast or recommendation for consideration by an analyst. For example, the AI tool could provide a credit rating that validates a rating derived using more traditional methods.

A middle of the road approach is what has been described as ‘management by exception’. This means that the AI tools have a degree of autonomy to operate within certain parameters that represent the norm that is inferred from historical data. These limits should be defined and tested to ensure their appropriateness. Cases that depart from that norm are then referred to an analyst for consideration to improve and verify the predictions. Where the AI tool has been developed based on an explainable AI approach, this should also provide evidence to calibrate the interaction between the analyst and the AI tool.

In addition to the consequential benefits associated with perceived fairness and trust, this type of interaction between human and AI can usually enhance the overall accuracy of predictions. An example, from healthcare is apt: an AI algorithm could appropriately predict metastasis in breast cancer in 92.5% of the cases compared with a pathologist whose performance is 96.6%. However, when the predictions of the algorithm and the pathologist are combined, the result has an accuracy of 99.5%.\textsuperscript{21}

Another aspect of the operating model reflects the recognition that AI tools may be operated by front line staff that have not been involved in its development and must be trained to the appropriate level to ensure that the AI tool operates effectively. Where management by exception is adopted, staff would need the appropriate knowledge and skills to deal with the exceptions.

8. Concluding Thoughts

AI tools can be a source of competitive advantage for financial services. This requires regarding AI as a transformational challenge rather than a new tool or technology. The introduction of electricity is offered as a similar case of transformational change.

There are inherent risks in developing and rolling out AI tools. Financial services businesses have regulatory responsibilities that might suggest caution. However, the application of risk management can help monetise the value of AI tools in a sustainable manner. Adopting AI solutions without considering risk management as set out here may well work in the short term. However, it is unlikely to be sustainable or scalable to yield the intended benefits of the technology. Applying risk management will cost money and resources, but it should be regarded as the cost of doing business in the digital era.

As noted earlier, the use of AI tools also has the potential to change a business’ risk profile. This may or may not be the original intention, but it becomes more likely. The considerations set out here for a risk management framework should not be regarded as a point-in-time consideration but as a basis on which an approach to monitoring AI tools is developed.

Financial services businesses already have mechanisms for monitoring the quality of portfolios. Where AI tools can influence exposures, it is important that there be a regular monitoring of the portfolio of exposures and changes. The challenge is getting the appropriate frequency of monitoring. The latter may require investing in systems to access information on a

\textsuperscript{20} PRA (2018).

\textsuperscript{21} Agrawal et al. (2018).
timely basis to ensure there is a continuous understanding of how the tool performs at an individual level.

Financial services businesses should use risk management to consider proactively the potential role of AI and create the necessary infrastructure to ensure that AI tools achieve their transformational potential.

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