Artificial Intelligence – The Ghost in The Machine?

Game Changers – Future trends in Securities Services

A practical and commercial look at the implications of AI for investment managers and securities servicers.
Introduction

Welcome to the latest of our Game Changers papers, examining the impact of technology on the investment industry. This time we’re looking at what could be the most far-reaching innovation of all – Artificial Intelligence.

Artificial Intelligence (hereafter, AI) is not new. It first became a formal field of academic research in 1956. But remarkable recent advances have captured public imagination, prompting utopian – and dystopian – predictions about the effects of AI.

In the same way, the recent explosion of data volumes and computing power has prompted a dramatic re-evaluation of AI by the financial sector. The industry as a whole is expected to spend more on AI than any sector, bar technology, in the next few years.

Interest in AI is particularly strong in investment, a sector based on the intelligent use of information. AI technologies are already revolutionising firms’ abilities to leverage the value of internal, external and alternative data. Could they create a future in which machines entirely take over core investment functions?

This paper explores the commercial implications of AI for asset managers and the securities servicers that support them. Drawing on our experience, we debate six key topics including: How AI fits into investment; how it can be used; what determines success; how firms should manage AI; and what it means for human intelligence.

We hope that clients – and the industry at large – will find this paper a helpful contribution to the AI debate.

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1 What AI can’t do (yet) for your business, McKinsey Quarterly, January 2018
Executive Summary

Few technological innovations have excited such heated debate within the investment arena as AI. Spending on AI is climbing fast and firms are developing new partnerships and strategies to enable them to take advantage of its unique capabilities.

This paper aims to take a practical, commercial look at the implications of AI for investment managers and securities servicers alike. Our summarised views are that:

- **AI is already being put to work by many firms, and its applications are accelerating fast. Like any other tool, making best use of varying AI technologies depends on integrating them with other capabilities in a way that enhances business processes.**

- **AI can enhance a huge range of front and back office processes, and has the potential to transform many of them entirely. Combinations with other software, hardware – and people – are key to achieving practical benefits.**

- **An effective data strategy is paramount to creating value from AI. But firms also need to effectively manage innovation across the organisation including leadership, development, training, security and their own culture.**

- **AI is a moving target as well as a disruptive technology. Successful implementation depends on bringing technical knowledge and business expertise together. Firms need to balance a range of factors including clear vision, agility and effective partnering.**

- **The human-machine interface is central to deriving value from AI, especially in the long term. The most successful firms will use AI to enhance the value of staff, not replace them. There is the possibility of doing more without growing the headcount. AI can replace roles which have routine/repetitive tasks with more cognitive ones. These will aid institutions to increase their returns on cost bases by boosting productivity.**

- **The continuing development of AI will have far-reaching and previously unforeseen effects on asset managers, financial markets and the industry at large. This unpredictability means that no firm can afford to ignore the potential impact of AI on its business.**

In our view, there is no need for AI to be hyped – the technology and its fast-evolving capabilities speak for themselves. The ability of AI to replicate human roles holds major opportunities for individual firms able to harness its power. But it also poses huge questions about how the industry works, how it is structured, and how it creates value for investors.

Implementing AI poses some unique challenges, but none of these should deter firms from developing AI capabilities, whether in-house or via managed services. Contrary to popular belief, AI implementation does not need to be costly or disruptive.

We believe that this is too big an issue for any investment manager or service provider to ignore. We also see significant risks from a wait-and-see approach that fails to keep a close eye on the latest developments. Every investment firm needs a clear, considered approach to AI that complements their wider strategic goals.
Key Areas of Debate

1. What is the role of AI in investment?

For investment professionals, the ‘AI label’ can seem vague – and intimidating. But a solid understanding of AI is essential to realising its potential benefits in areas such as cost reduction, revenue enhancement and client experiences.

AI is not a single technology, but rather can be viewed as computational algorithms leveraging mathematics and computer science to create a number of tools which in turn analyse digitised data. The most eye-catching applications of AI often involve machine learning (ML). Machine learning (and its subset, deep learning) can teach itself, changing its approach to a task based on its experience and requiring little or no human supervision. In investment management, for example, ML can scan huge amounts of unstructured data for indicators of future price events (see Debate 2).

Other forms of AI include Natural Language Processing (NLP) and Automated Reasoning. And at the opposite end of the scale from ML, robotic tools use AI to learn how to conduct repetitive, rule-based tasks with ever greater efficiency – a process known as cognitive robotics. Securities servicers can use cognitive robotics to achieve continuous improvements in the efficiency of high volume functions such as look ups, data transfer, calculations and reconciliations.

The disparity between machine learning and cognitive robotics can make it appear that investment applications for AI are divided into low-value tasks and high-value problem-solving. The truth is more complex.

- AI encompasses a broad range of overlapping capabilities. All AI tools can learn, but most require varying degrees of human coaching or ‘supervision’ to do so.
- This spectrum of AI capabilities can be applied to both simple and complex investment functions.
- Furthermore, several different types of AI can be used to improve the same process. For example, ML tools can teach less advanced robots to enhance straight through processing by learning to identify and correct errors, leading to a faster service and fewer hand-offs.
- AI can also play a major role in supporting human decision making, by giving additional insights or ideas to professional experts. This sort of collaboration is sometimes called augmented intelligence.

In theory, AI can perform almost any operation involving data. In reality, investment firms need a practical approach that allows them to identify which AI tools, or combination of tools, will best enhance their commercial activities. We now examine use cases in more detail.

In summary

AI is already being applied to a range of investment functions, and its capabilities will only increase as the technology evolves. The foundation of any successful AI strategy is to understand how different tools work, and how they can be combined with other human and machine capabilities to make practical, commercial improvements to the investment process.
2. What are the investment use cases for AI?

AI tools could ultimately perform many of the investment industry’s core functions. In the next few years we expect AI investment to cluster around a number of key areas.

**Investment analysis.** AI can help asset managers to analyse internal and external data for investment signals. Combining AI tools such as ML and NLP could be particularly valuable when it comes to screening unstructured alternative data such as web traffic. Firms reported to be using AI for investment research include BlackRock, Fidelity, Invesco, Schroders and T. Rowe Price. Securities servicers also have an opportunity to obtain insights by leveraging their access to data on prices, holdings and trading flows – generating client deliverables such as market sentiment heat maps, or the provision of data as a service (see Debate 4).

**Portfolio management.** Some investment firms are already using AI to monitor investments, enhance asset allocation and even for portfolio construction. One recent study suggested that 31% of hedge funds use alternative data and analytics in portfolio management, with another 21% planning to do so within two years. Axa’s Rosenberg is reported to be using a neural network to manage its sustainable equity fund and BlackRock has been operating a scientific Active Equity Group for several years.

**Middle office.** The ability to analyse data for hidden patterns means that AI can replicate much of the work of quantitative analysts, often with lower error rates. That includes detecting investment tail risks, analysing the performance of portfolio managers and detecting fraud or money laundering.

**Client handling.** Robo-advisors already use algorithms, and many plan to implement customer-facing AI. Traditional firms can do the same and use AI to enhance client segmentation, personalise communications and automate query handling. AI technologies such as NLP have huge potential to enrich client experiences by interpreting vocal, emailed or unstructured requests. For example, AI tools using document text extraction are reported to be able to cut KYC times from days to minutes.

**Investment operations.** AI tools have a wide range of applications within the back office. In our own experience, AI has the potential to:

- Smooth interaction between platforms, making it faster and easier to carry out end-to-end processing of settlement, valuations and fund accounting;

- Automate labour intensive processes such as transfer agency and corporate actions, by identifying, capturing, scrubbing and acting on events such as dividends or redemptions;

- Enhance customer support functions such as query handling, for example by providing auto-responses to trade enquiries; and

- Use predictive analysis to identify transactions that are likely to fail, helping to quickly remedy problems as they occur.

This is far from a definitive list of potential AI applications in investment. We therefore suggest a few overarching rules of thumb to help firms identify the most valuable use cases.

- AI use cases are best assessed through a process lens rather than on the basis of entities, geographies or business units.

- There are few theoretical limits to what AI can do with enough investment. It is usually more useful to judge AI in terms of the practical improvements it can make to key business functions.

- Don’t just ask whether AI can perform a process or function faster and more reliably than before. It may be able to simplify, improve or replace the process altogether.

- AI use cases don’t have to be headline-grabbing to be transformative. The cumulative effect of marginal improvements can create major gains in efficiency and productivity.

- The greatest benefits of AI often flow from combining AI tools with each other, or with other software. For instance, securities servicers can not only use AI to enhance processing, but could also provide clients with pro-active insights such as market sentiment heat maps via the same interface.

- AI is a ‘moving target’, and use cases will only multiply as the technology advances. So firms not only need to understand what AI can already achieve, but how it may evolve in future (see Debate 6).

In summary

AI has the potential to perform a huge range of investment functions and deliver a wide variety of client benefits. Investment over the next few years is likely to focus on investment analytics, client handling and process improvement but AI has the potential to redefine or even replace many current practices. In the long term, it could have huge effects on the investment value chain.

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2 Asset managers’ fight for alternative data analysts heats up, Financial Times, 29.01.18
3 Improving investment returns via new insights from new data sources, SimCorp Journal, 15.06.17
4 Axa’s Rosenberg harnessing AI in portfolios, Ignites Europe, 13.10.17
3. How does AI achieve good outcomes?

In our view, realising the potential value of AI depends on two key success factors. The first, and by far the most important, is data. No machine, however smart, can do better than work with the data it is given. In particular, the ability of AI to learn depends on two things.

- **Data volume.** The greater the volume of data, the greater the potential value of AI. Tapping the value of in-house data depends on pooling data effectively, or on enabling fast and flexible connections between platforms. The challenges of connectivity are even greater when it comes to using external information – but so are the potential insights.

- **Data interpretation.** Different forms of AI can work with different types of data. ML has the potential to sift through alternative data such as social media chat, geolocations, satellite images, weather forecasts, online sales or credit activity. Other AI tools may require data to be tagged or labelled before use. Whatever the data format, effective feedback – whether manual or automated – is essential to ensuring that AI learns the right lessons. For example, a technique called reinforcement learning (a form of trial and error) can help some AI tools to work around data labelling limitations.

These requirements mean that a joined-up approach to data is vital to allowing every organisation to make the most of the information they hold and overcome the limitations of legacy technology. Application Programming Interfaces (APIs) can play a key role in gathering data from external sources, or in creating smart data lakes with standardised formats that facilitate AI interrogation (for more on this subject, read the Game Changers report APIs – Joining the Dots).

The second area of success factors fall under the heading of organisation. Some of these practical factors - such as financing, project management and effective oversight – are similar to any technology project. But others are particularly important to making a success of AI. In our view, these include:

- **Leadership.** The leaders of investment firms rarely have a technology background. More CTOs are joining boards, but often spend more time on existing technology than on innovation. Firms need leaders that can set out an AI-enabled vision that combines existing strengths with new capabilities.

- **Human skills.** The right human capabilities are essential to deriving value from AI (see Debate 5). Good relationships between business specialists (leaders, managers and strategy teams) and technicians (engineers, data scientists and quantitative analysts) are essential.

- **Testing and development.** Many firms work with external partners to develop proofs of concept (POCs) for AI, and to conduct alpha and beta testing. For a typical asset manager, this means working with securities servicers, software vendors, cloud providers, FinTechs and consultants (see Debate 4). Selecting the right POCs – and the right partners – is crucial to demonstrating proof of value.

- **Security.** Testing AI POCs can require investment firms to give external developers a degree of system access. Cloud computing can also allow POCs to be tested in minutes rather than the days or weeks that in-house systems might take. In both cases, firms need to balance security with flexibility.

- **Culture.** Hierarchies, silos, risk aversion and fear of failure can be major barriers to AI adoption. One investment manager admitted that its portfolio managers failed to act on key AI predictions, even when – with hindsight – they were proved correct. Succeeding with AI requires an agile culture that combines the prudence of financial services with the experimentation of the tech industry.

The need to ensure these critical factors are in place means that the effective management of innovation is crucial to making a success of AI. This is the topic we turn to next.

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**In summary**

The entire premise of AI depends on access to large volumes of data, in a format that AI can interpret and learn from. The importance of an effective data strategy cannot be overstated. A range of other organisational factors are also vital to success. In many cases, these will require investment firms to take a more agile approach to innovation than has historically been the case.

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7 BlackRock: hard to trust AI even when it’s right, Ignites Europe, 02.11.17
4. Is there a right way to implement AI?

Given the challenges posed by implementing AI – including the speed with which the technology is evolving – the effective management of innovation is becoming vital to achieving success.

On the upside, implementing AI does not typically require changing firms’ core systems. Subject to the success factors discussed above in Debates 2 & 3, AI tools can usually work with existing platforms. This makes it relatively easy to test and implement use cases without disrupting client services. That means that ‘start small, move fast’ can be a valuable philosophy. By encouraging groups throughout the organisation to propose and test AI use cases, this helps to generate lots of potential applications and can quickly eliminate those that don’t add value.

However, a ‘scattergun’ approach has its limitations. Some form of top-down oversight is also essential to getting full value from AI implementation. A centralised view allows firms to prioritise the best use cases; to target investment; to monitor overall spending; to scale good ideas quickly; and to leverage applications across silos or entities.

There is also a third aspect to consider. Some asset managers are developing AI in-house, but most investment firms may need to work with external partners. Smaller and mid-tier asset managers in particular may decide to outsource significant portions of their AI development. It follows that identifying the right external providers and partners and working with them effectively is crucial to effective implementation. FinTechs can offer cutting edge machine learning, while larger vendors may provide a cloud-based analytics platform. Securities servicers offer scale advantages in terms of investment capital and data access, and are working to integrate AI tools into their aggregated, flexible data access offerings – sometimes called data as a service.

Firms can take a range of approaches to reconciling the competing imperatives of agility, direction and partnership. These include building centralised innovation labs; using centres of excellence; and taking a delegated or ‘federalised’ approach to development. Larger firms may need a combination of tactics, such as a two speed approach with a fast lane for testing and another for business rollout.

Whatever approach is chosen, the key requirement is for data scientists who understand the technology to co-mingle with business leaders who see the commercial potential of AI. It is up to individual firms to strike the right balance between centralisation and localisation; between internal and external expertise; between technology and the business; between theory and practice; and between current and future applications.

Ultimately, the most important goal for asset managers and securities servicers alike is to focus on delivering benefits to investors. The smartest AI will be of limited value if it does not improve client experiences.

In summary

AI is a moving target with greater potential for disruption than most technological changes. That makes it essential for firms to devise an implementation framework that synthesises technical expertise with business experience. There is no ideal approach, but firms need to balance competing priorities, make use of the latest collaborative techniques, and maintain a clear focus on improving client experiences.
5. What about people?

If there is a single factor that explains why AI has become a global news story, it’s people. Many debates about AI quickly turn into discussions about its impact on people in the workplace.

Every technological innovation can threaten jobs, and AI clearly has more potential than most to do so. In the short to medium term, AI tools such as NLP will begin to take on roles involving repetitive tasks and narrow expertise. In time, more advanced ML tools may also take on a surprising amount of work that is currently considered to be too complex or too varied to be automated – such as strategy or marketing.

Even so, the idea that AI will lead to sudden job losses or the elimination of whole business functions is simplistic. AI will reduce key person dependency and gradually take on greater responsibility. But hands-off automation of most functions is unlikely to be feasible within the next five to ten years. Even in the longer term, humans will remain vital to getting the greatest value out of AI. After all:

- Developing and operating AI requires significant input from engineers, data scientists and quantitative analysts. That is especially true for machine learning and deep learning. Even firms that choose to outsource their AI requirements will need to maintain a minimum level of in-house expertise.

- Many AI outputs are most valuable when combined with, or applied by, human intelligence, not only interpretation and judgement but also empathy. The ability to work with AI will become central to many investment roles including analysis, portfolio management, risk, compliance and operations.

- Although companies are working on AI with computer vision which can read human faces and thus their emotional states, human sensitivity, and the ability to read body language will always have an essential role to play in client relationships, for instance when providing financial advice, investment guidance or complaint handling.

The rise of AI will significantly alter employment models over the next few years. But its effects will be more subtle than mere headcount reduction. In fact, treating AI as an opportunity to develop more fulfilling human roles will help firms to attract and retain the best talent. For example, while AI could be seen to threaten the role of offshore service centres, we expect it to increase the value of the human insight offered by highly skilled offshore workers.

In short, AI will complement human intelligence in the investment industry, not replace it. In fact, developing this kind of augmented intelligence could become a crucial source of competitive advantage for asset managers and securities servicers. Ultimately, the firms that make the greatest success of AI may be those that manage the human-machine boundary most effectively.

In summary

Effective interactions between humans and machines are essential to creating value from AI. That not only applies to the development phase, but also to making a long-term success of AI applications ranging from robotics to deep learning. Instead of replacing people, AI could in fact help investment firms to create more fulfilling roles for employees – and to derive greater value from their human capital.
6. What are the unanswered questions about AI?

The application of AI to investment is still in its infancy. We have debated what we see as the most important questions over its short to medium term development. But what about the longer term unknowns? In this final section we ask what we see as some of the most interesting unanswered questions about AI.

What other AI use cases will appear?

We haven’t space to consider every existing AI use case, let alone future applications. AI can not only transform existing functions, but create totally new developments such as hagglebots navigating the web on behalf of their owners, or virtual investment avatars accompanying investors throughout their lives. The ability of AI to work with legacy systems and to turbocharge new technologies such as distributed ledgers (also known as blockchain), points to rapid future development.

What further challenges will AI face?

As AI takes over more decision-making, it is likely to face increasing headwinds. There is growing awareness that AI can mimic the biases of its supervisors, or be undermined by weaknesses in data. The decisions taken by machine learning AI can also be hard for humans to rationalise. Bias and opacity could lead to undesirable outcomes in areas such as fairness, equality and transparency. Developers need to think carefully about how AI tools might affect investors and other stakeholders.

What about regulation?

So far AI has received a cautious reaction from financial supervisors, although jurisdictions such as the UK and Singapore have set up ‘sandboxes’ for testing. The Financial Stability Board has highlighted the upside potential for efficiency and supervision, but also downside risks to transparency and systemic stability. As the use of AI becomes more widespread, it seems certain to attract growing regulatory attention. The recent revelations about the extract of data from Facebook, may yet have some regulatory repercussions. However, it is up to the industry to ensure that the impact of AI on investors and markets is a positive one.

How might AI change the investment industry?

AI is already adept at spotting short-term arbitrage opportunities. If it could achieve empirical improvements in fundamental analysis, the implications for asset managers would be profound. AI could then potentially erode the industry’s existing revenue base, which remains biased towards active strategies. Then again, AI might help some active managers to fight back against the shift to passive, with AI augmented analysis helping to deliver benchmark plus returns from a lower than traditional cost base. In either scenario, firms not accessing the technology could find themselves in a vulnerable position. More broadly, AI could reshape the networks of relationships between investors, advisors and service providers, putting asset managers at the centre of a complex two way data flow ecosystem in which securities servicers work with FinTechs, and other specialists, to manage and analyse data on behalf of its ultimate owners – end investors.

Could financial markets be affected?

The evolution of AI is likely to have some significant effects on the functioning of financial markets. Areas of impact could include high-frequency trading, the development of new asset classes, or asset allocation decisions by long-term investors. The possibility of some investors enjoying an AI advantage over others could lead to distortions in public markets, prompting regulatory reactions. Alternatively, AI could hasten the evolution of private markets.

In summary

If AI can defeat human masters of Chess or Go, it could clearly have a profound impact on the investment industry. This might involve revolutionary new services, or outperforming human managers. That would upend industry wisdom about barriers to entry, success factors, and winners and losers. However, the development of AI could also face unexpected challenges. One thing is for sure – firms cannot ignore AI.

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* Risks of AI must be monitored: FSB, Ignites Europe, 02.11.17
Conclusion

There is a large and fast-growing range of potential applications for AI in the investment world. As they weigh their plans, firms of all types and sizes not only need to consider what AI can already do, but how it might develop in future. That includes its potential to interact with other technologies and human intelligence.

Developing and implementing AI poses some unique challenges. These include the need for effective data governance and the importance of a number of soft factors such as culture, flexibility, leadership and partnering. Cutting across all of these is the importance of managing human-machine relationships in a positive and productive way.

These factors mean that implementing AI is a challenge like no other. AI presents huge opportunities for asset managers and securities servicers that can use it successfully – and a significant threat to those that can’t. The right innovation framework is essential to creating value and keeping client interests in focus.

AI’s potential to reshape institutions, markets and the industry as a whole means that every firm needs to monitor it closely, including those currently unable or unwilling to invest significantly in AI.

The AI picture is changing fast. Firms may find AI intimidating, or hope that it will not affect their business. But to ignore it is to risk being left behind as competitors race ahead. In our view, every investment firm needs to act now to develop a clear, considered view of AI and a strategy to take advantage of its potential benefits.
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