AI IN FINANCE:
WHY NO C-SUITE EXECUTIVE CAN AFFORD TO IGNORE IT

THE STRATEGIC IMPORTANCE OF AI FOR FINANCIAL INSTITUTIONS

By Sandro Schmid & Haris Jaqubi

Executive Summary

For far too long the financial service industry has operated in an inside-out fashion and relied on the same playbook. In 2020, when the Covid-19 pandemic started to spread around the globe, many market players faced first-hand the importance of maintaining client proximity and business efficiency. Therefore, one of the most relevant agenda items for C-suite executives was, and still is, to transform and continually adapt their operating model for a digital world. Ultimately, if done well, this can result in better client experience, realize cross-efficiencies within the organization and improve business profitability by market share growth. By transforming from the current to an ever-changing and modular target state, Artificial Intelligence (AI), specifically Machine Learning and Neural Networks are seen as essential enablers opening lots of automation opportunities for business processes with the highest degree of accuracy and promising results. Fundamentally, the technology behind AI aims to allow machines to mimic human intelligence so that they can learn based on historic data and perform automation and analytical insights.

Financial institutions are well advised in exploring the power of Artificial Intelligence (AI) in 2021

There is a broad agreement among numerous trustworthy sources that AI is the next industrial revolution. We can observe in the market that the adoption rate of AI by financial institutions is increasing much faster than initially anticipated by research organisations and academia. Comparing to last year, when the Covid-19 pandemic started, the AI adoption rate spiked around 10-15% in the US, European and Chinese market. The number for 2021 represents a remarkable increase up to 30%. This underpins the rising ambition and eagerness of financial organizations to automate their processes across business lines with bottom-line profitability expectations.
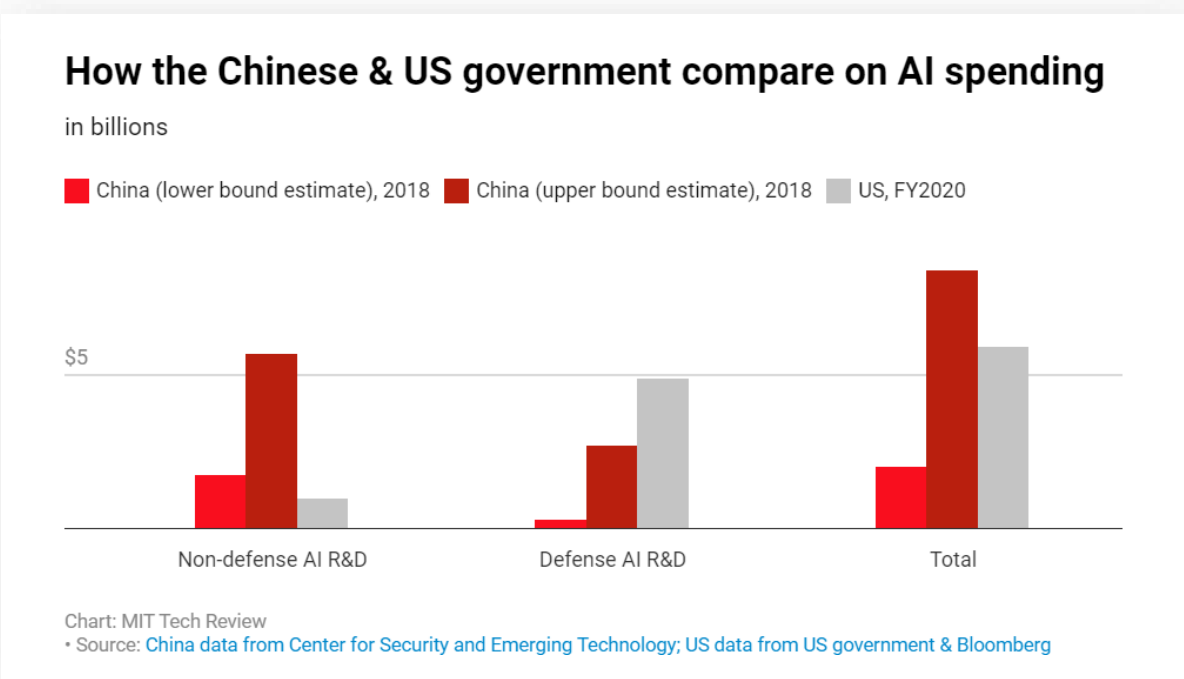
Therefore, it is imperative that those financial institutions which had not yet formulated an AI strategy will be forced to do so in very short term. AI is

extremely powerful and key to surviving and thriving in the coming decade; not addressing AI as part of the technical roadmap is a large strategic risk. Looking back, such moments can be fundamental, reflecting on Kodak, where digital photography was massively underestimated by the global leader, quickly caused chapter 11 in a very short term.

What is Artificial Intelligence (AI) and why it is so important?
AI was discussed a long time ago in different disciplines such as philosophy or literature. But the year where it kicked off was 1956 on the campus of Dartmouth College in New Hampshire, USA. Shortly after, Frank Rosenblatt built in 1958 the first AI application, which was a neuronal network to mimic how the human brain processes visual data and learn to understand objects that was able to recognize pictures. The coming years carried great hope and expectation along with substantial funding followed by disappointments, setbacks, loss of funding's (known as "AI winter"), re-followed by new approaches, success, and renewed funding.

According to Bloomberg, China invested approx. $12 billion in 2017 and increased investments by more than 400% to $70 billion in 2020. The three-step program released by China in 2017, clearly defined its goal to become an AI leader worth $150 billion by 2030. By comparing the numbers of publications, quality of these papers, number of researchers, leading AI companies and alike, the competition race seems to be currently happening between US and Europe, though a large chunk in the US is allocated to the defence sector.

How the Chinese & US government compare on AI spending
in billions

Chart: MIT Tech Review
• Source: China data from Center for Security and Emerging Technology; US data from US government & Bloomberg

While government investments drastically increased in the last years, similar trend is seen in funding investments in the US from 2011 to 2019:
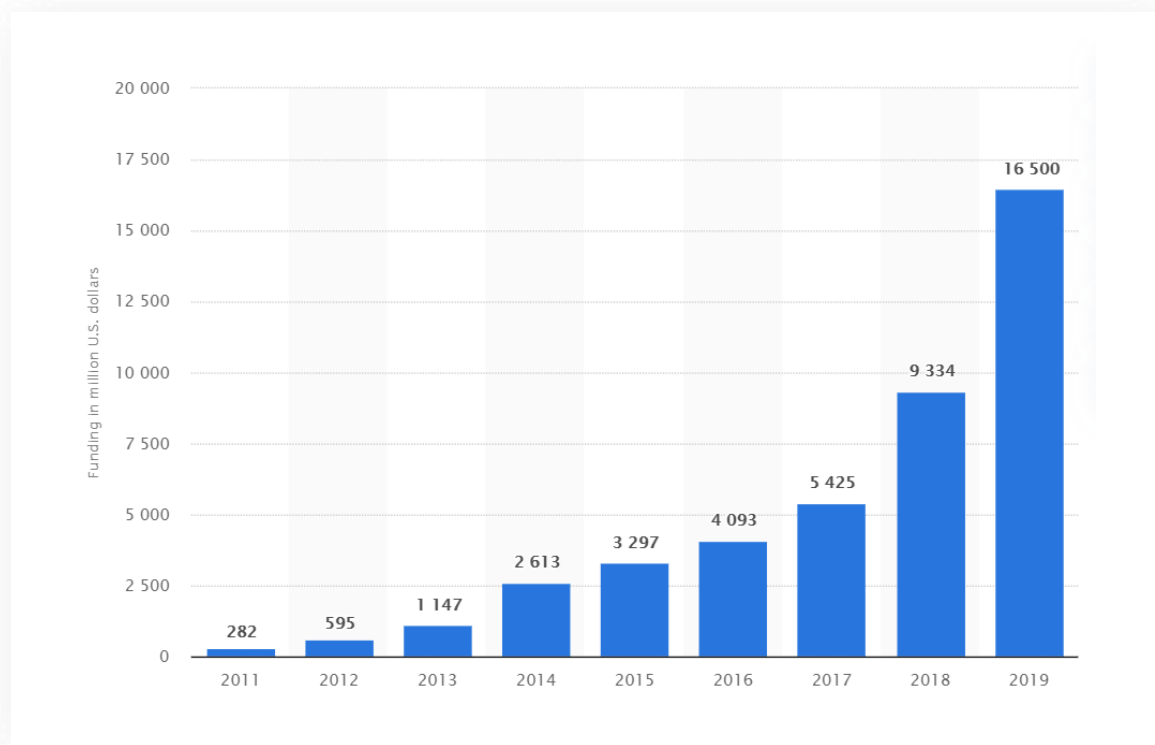
But what can we expect in the near future? According to Industry Research, the Global AI market is projected to grow by USD11.16 billion between 2020 and 2024, progressing at a CAGR of 39% during the forecast period. This underlying data highlights the growth indication and acceptance of ML across the globe. In the healthcare industry AI has already a strong acceptance, as for instance it was used to combat the Covid-19 pandemic where ML was applied to identify protein structures faster for vaccine discovery. AI substantially reduced the time and costs to discover such new medications compared to conventional methods, supported by innovative new hardware (GPU). But healthcare uses AI in a much broader sense starting from smoother operations, automation of administration, e-health records to diagnosing different diseases and many more. AI is fully adopted in healthcare and pharmaceutical sector and will not only stay but further shape the future of the health industry.

In Finance, several large banks in London, New York, Zurich, or Frankfurt started to build up AI practices and/or identified different use cases even with first running applications. Nevertheless, the broad adoption in Finance, as we can see it the pharmaceutical sector, is yet to come.

Maybe one of the reasons is the often-heard counter arguments for AI, that the technology was at hand for a long time so why should it be more relevant today?

First, any innovation takes time, no matter what it is, thinking of planes, electric cars or elevators.

Further, today AI is substantially different than in the recent past in respect of complexity, ability, speed and performance. Modern enhanced and innovative hardware (GPU) and software, cloud computation and the ability to store rather inexpensive large amounts of data contributed to this new environment that is essential for AI.

But what do we mean with AI?
Today, we understand different things under Artificial Intelligence (AI) but in general, we mean developing software, robots or other systems that can act or think like humans. Furthermore, we distinguish between "strong AI" and "weak AI".

Strong AI is what people typically mean when they talk about AI because this is what we see in movies or read in books. It is about machines that become self-motivated, have emotions, can dislike someone or something or are even able to love. This futuristic view that AI can solve on its own any sort of problem, is superior to humans and has its "own agenda" is currently farfetched.

On the other hand, we talk of "weak AI", which is presumably a misleading term but describing realistically what organizations currently can perform. Nonetheless, weak is not an appropriate term to describe what AI can do today, thinking e.g. of AI that beats humans in chess, GO, Jeopardy, and in fact in any other game humans play. Weak AI can write books on its own, compose music (such as the song in the Beatles style called "Daddy's Car") or even create a short SciFi movie (Sunspring). It seems fair to say, that neither the song or the movie would have won a prize in a contest compared to humans but then again, neither the song or the movie would be the worst we have produced.

This type of AI always deals with one, and only one, specific problem but solves this often better than humans. Industry examples are automatic text processing, which is very helpful considering financial regulation and the large amount of text to be processed. AI can recognize on-time unusual behaviour of employees

(traders, relationship managers, fund managers etc.), automatically generate financial advice e.g., in the field of Forex hedging or identifying criminal credit card expenses.

All these cases and the corresponding AI are specific and cannot be used for another problem. Such systems solve problems in broadly the same way as humans; thus, they fall under the term of "artificial intelligence".

While building such AI solutions, the so called "Machine Learning" is used which is a category of methods within AI. Machine Learning itself uses data to learn general concepts from it and then applies them to new data. Underneath the term Machine Learning, there are numerous different quantitative models but whereof none is always the best methods. Each problem has its own peculiarities and needs its own sort of AI.

Examples of the methods within machine learning include regressions, decision trees or neural networks, as well as deep learning algorithms as a specialization. These methods solve tasks such as the aforementioned sorting of images into categories, automatic text recognition or the prediction of events.

Furthermore, there is a distinguishment between supervised, unsupervised, and semi-supervised machine learning and each of these methods have advantages and disadvantages. Supervised machine learning means that someone "supervises" what the machine is doing by giving the data specific meanings, and unsupervised machine learning generates results based on an algorithm to define patterns where no human has labelled the data beforehand. Semi-supervised is a combination of both methods which engages small chunks of labelled data and larger chunks of unlabelled data. The objective of a semi-supervised ML model is to leverage the expertise, which the model has learned from the labelled data in order label unlabelled data. The prediction accuracy is usually high.

Artificial Intelligence in Finance
Artificial Intelligence, along with cloud computation and/or Big Data, started to become strategically important for any financial institution in the last years. The main reason is the ability with AI to generate better results in analysing large and/or complex data and patterns than humans, which is very useful while analysing and predicting any of the many tasks a financial institution does on a day-to-day basis. Examples can be found in most areas, e.g., identifying

customers' needs and preferences for individualized advice, enhanced pattern recognitions for anti-money laundering to reduce false positives i.e., wrongly identified customers that are not involved in any money-laundering, or better credit risk models to reduce losses. Clearly, AI can also help in many other areas such as trading, investment management, payments, fraud, operations, to name a few.

For automation and digitalisation, AI technology plays another core function - sometimes called Hyperautomation, which is the new global tech trend. It enables industries to automate all possible operations, gain intelligent and real-time insights from the data collected and fully automate various tasks independently. Banks, Insurance and Asset Managers can upgrade many of their existing operating systems with AI to better serve their clients offering new services on an automated basis (100% STP). The rationale is that AI engines can be built in a way so that they are able to handle standard non-complex tasks automatically. The benefits are clear: Financial institutions reach more customers 24/7 while those services which the AI engine cannot cover, will remain in humans "speciality hands". This is job enriching and benefits all stakeholders once specialists are able to reduce monotonous work and utilize their higher skills for the more complex transactions. The team impact from focusing on more relevant activities and improving delivery efficiency which fundamentally increases the joy of work.

The potential of AI in Finance is enormous and those institutions who are able to grasp the power of AI will be substantially better positioned in the near future then compared to their peers.

CTO foundations how to enable AI in banking
Overall, there are currently four areas of technologies where many CTOs highlight the need for support for enabling AI: **Cloud computing** to vitalize AI algorithms in the best bay, **big data** databases to store historic and learning data, **open-source technology** to improve cross-industry collaboration and economic performance and last but not least, **5G** for efficient exchange of data packages on-device.

The term **Cloud computing** is everywhere. In simplest words, Cloud computing is the storage of data and applications over the internet instead in hard drives. It can be seen as the precursor for the emergence of big data and an effective catalyst

for AI models. Most companies that implemented Cloud computing benefit from fast time to market, modularity and flexibility in meeting client's needs as well as an ease of new and existing cross-infrastructure integration (plug´n´play). Depending on the size of learning and historical data (statistical mass), Machine learning algorithms for organizations are extremely data and computing intensive. The scalability that Cloud computing offers, powered by huge infrastructure centres around the world at low cost, massively reduces the training and code performing time of AI models. Financial institutions benefit from processing and running a huge amounts of data in the cloud with on-demand flexibility.

The term **big data** describes massive, complex stored or newly created structured and/or unstructured data, that are rapidly generated and transmitted from a variety of different sources. According to many scientists, it consists of the five Vs: Velocity, Volume, Value, Variety and Veracity. To result in meaningful outcomes, big data and AI should be seen as complementary with a merged synergistic relationship as AI is useless without data, and data mastering is impregnable without AI. The last decades most financial institutions made heavy investments in big data and insight analytic infrastructures for collecting, processing and managing data efficiently and effectively.

Open-source software technology is usually free to access, use, and change without any restrictions and plays a key part in the development and use of AI. Looking at tech giants of the FAANG network (Facebook, Apple, Amazon, Netflix, Google), they all made impressive progress by adopting open-source technology and with that, releasing much of their book of work to their own public community. The rationale behind is that it provides a solid foundation for innovation by bringing larger labour pools and their diverse expertise together as well as building up an open community which is collectively contributing to development and delivery improvement. Open-source software lowers costs and decreases risks for financial institutions in their adoption plans for AI. As an open ecosystem, it widens the endorsement of real-life/practical use cases, which can be an essential reference point for financial institutions which are aspiring to improve already running AI models that have been developed in-house. With all these, organisations can easily reduce development costs in the banking industry and focus more accelerating AI adoption internally.

5G, the fifth-generation cellular wireless creating a ubiquitous connectivity fabric, and AI are both disruptive technologies. By combining these two, a significant amount of data is processed at its core and source which offers crucial benefits in

the area of privacy, personalization and reliability through on-device AI processing. On one side, it will lead to more efficient wireless communication, longer battery life and improved user experience and on the other side it also impacts on network management – such as improved service quality, easy deployment, improved network efficiencies as well as security on-device. But where are benefits for financial institutions concretely? With mobile usage continuing to accelerate massively, many clients are looking for new service offerings which match the evolving technologies in their pockets and on their twists. Low latency bandwidth offers (near) real-time information collection and delivery of data packages ranging from payment information to location specific needs, paving along the road for new AI-based personal banking services fundamentally, the combination allows financial institution´s smart devices to offer client insights and predictive analysis in real time to support mobile customer interactions.

What are barriers or challenges for adopting AI in financial services?
Within the financial service industry, a broad range of processes and capabilities may be not only affected but even re-shaped by AI. An incomplete list of these capabilities relates from client prospecting and onboarding to investment management advisory, order management & trading, regulations and compliance, HR operations as well as enterprise & cyber security. However, most of the organizations are not mature enough and there are still some years behind to make the use of AI cross-division and overall enterprise ready amongst all relevant data driven capabilities. To ensure a bigger acceptance within the organization, all related barriers around AI must be grasped by Board and/or C-suite executives.

AI acceptance is probably the biggest black box and therefore critical to improve in public discourse. Building and utilizing AI models that are promising the highest level of accuracy must be transparent and explainable to as well as trusted by the organizations´ client base – without any lack of trust in the decision-making process as well as the lack of warranty to colleagues and roadmap stakeholder who are affected by those results. Financial institutions must always be able to comprehend, assess, validate and explain how predictive decisions, recommendations and outcomes result through their AI models as client data is being used to define and build those AI models.

Siloed and non-qualitative data is presumably the second challenge AI adoption will face in the next years. The provided and processed data quality plays an essential role on model performance and accuracy. To understand and validate the "big picture", financial institutions must collect data correctly and structure it properly otherwise there is a huge risk of unknown AI model behaviour. This is why for a bank the biggest challenges are firstly concerns regarding the collection, utilization and sharing process of clients' data, and secondly requirements for a cleansing process for unstructured and non-qualitative data. Data converting (from poor to good quality) is expensive and very time consuming. This is why it should be a priority to transform the huge volume of data captured on a daily basis into machine readable, AI friendly formats.

Legal and regulatory requirements are the third challenge AI adoption will see along the road. Without an AI based data governance, defective algorithms can cause legal issues as is will presumably make incorrect and unfavourable predictions with an inappropriate set of data. Basically, financial institutions are worried that new regulations may increase unexpected costs, generated by the insecurities and doubt of an emerging technology like AI. On the one side, data privacy may impact AI development, e.g. General Data Protection Regulation (GDPR) includes data protection principles and regulates entities that process the personal data of EU citizens or residents or offer goods or services to such people. For example, GDPR Article 29 requires clearly transparent customer profiling, where profiling points to the assessment and evaluation of personal aspects by processing personal data, like prediction of preferences or segmentation classifications. Fundamentally, AI models are not open to any reader, and may put privacy at risk. The use of tools to address privacy for data leveraged by AI applications is essential for financial institutions in increasing AI trustworthiness.

Essential questions for board and executive board members
It is clear that AI is by far too important for any company and cannot be ignored on the strategic roadmap. If not yet done already, board and/or ExB' members should have a clear description on how to cope with AI today and in the future. This strategy needs to cover numerous aspects, among others:

- How to inform and educate employees and shape an organizational culture that believes AI is supporting growth and not killing jobs?

- Where are best areas to adopt AI, what problems can be solved and which new services can be offered through it?
- Which processes can be upgraded to 24/7 service with zero STP breaks?
- What technology should be selected and how should it be connected to the existing IT?
- What possible marketing initiatives should be envisaged?

We are standing at the beginning of the next industrial revolution, at the point where the curve is getting quickly steeper. Using the momentum to set the right strategy should not be underestimated.

Lucht Probst Associates (LPA) as global provider for Capital Markets and Wealth Management solutions with leading capabilities in AI, digitalization and Advances Analytics, supports its customers in their strategy definition to fast track the journey and elevate their strategic decisions for value growth. LPA´s approach is very structured, outcomes-focused and ethical. LPA supported some of the biggest financial institutions on the adoption of AI, an excerpt of real-life use cases can be found below:

1) Heath check for an international Financial Institution

A large bank and asset manager operates several trade surveillance solutions with a large number of surveillance models/rules. Since the calibration of the models has been based almost entirely on expert judgement, a review of the adequacy of the models and parameters is deemed necessary. With its unique experience in the field of products, trading and market manipulation, LPA helped the client to create an overview of the status quo of their trade surveillance set up. Using qualitative and data-driven analyses, optimization potential in the selection of the rules used and their calibration could be identified. *Benefit outcomes for the client were* the 1) identification of several surveillance rules that were included in others and therefore can be deactivated, identification of gaps in existing rules and recommendations on how to close them as well as deriving optimization measures in calibration based on analyses of historical alerts and trading data.

2) Custom AI/NLP regulatory change solution aiming to read financial regulatory documents fast and highlight relevant changes immediately

The amount of financial regulations has only been increasing in recent years and financial firms agree that the regulatory burden will only continue to increase. Therefore, a leading Swiss financial services company wanted to build a ground breaking new digital solution that minimizes the burden of new or changing regulatory text to build a solution that automates regulatory handling and collects intelligence in the system. The manual processes of constantly reading large amount of new regulation or regulatory changes were absorbing high amounts of time plus the used time was often allocated to read non-relevant regulation or duplications. By mitigating the manual process of deciphering documents, we were able to create a tailor-made AI solution, which drastically reduces the time and resources needed to maintain and update your regulatory frameworks plus substantial more convenience for the compliance department. Through the use of AI LPA was able to understand what parts of the documents are relevant and also outline which parts effect previous regulations and bring to light all new regulations and relevant information which is then presented in a neat and efficient manner.

Benefit outcomes for the client were the 1) reduction of manual effort allowing resources to undertake more important challenges, 2) Time and resources saved as well as Store all data and publications in a safe place which is then able to be searched through, annotated and extracted whenever necessary.

---

3) In-house built solution measuring market risks for an international Wealth Manager
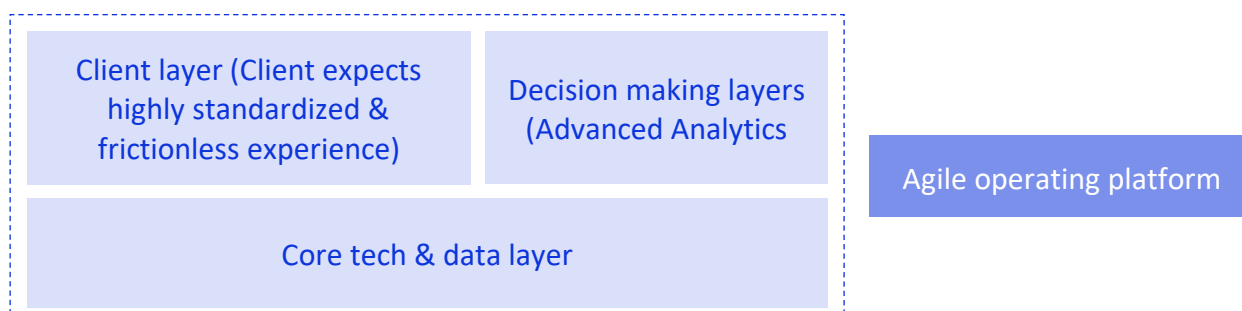
One of the biggest Wealth Manager globally has mandates us to build an efficient, fast and accurate market risk measurement & assessment solution including an AI-based portfolio optimizer. Our in-house built software solution, is a high-end tech solution that measures market risks in several asset categories very accurate, stable and fast. The solution measures current expected returns, different risk measures and dynamic portfolio correlations. Based on this information, a signal is triggered where a full audit trail is recorded for any decision. Further, an AI based portfolio

optimization is embedded to increase returns and/or reduce risks. The engine has several additional features such as real-time warning system, can send key figures such as sharp ratio etc. Benefits for clients are 1) a fully scalable engine which runs highly precise quantification in milli seconds to enable ad-hoc digital advisory with simulations through a high performing API, 2) numerous additional features such as for illiquid assets, FX hedging, product shelf validations and others.

---

4) Application of OCR and NLP to automatically read and extract key data from high volume flows of faxed and emailed pdf documentation at a major custodian bank

A custodian bank typically receives documents from numerous sources, in varying formats and often various conditions. The process was considered to be only ever manual, however when exasperated when facing growing volumes, the bank asked LPA to propose an automation solution for which we applied AI for Optical Character Recognition (OCR) and Natural Language Programming (NLP). Successful trials not only proved this effective, but the software was able to be trained to learn new formats of documents and cope with them. This solution is being further rolled out to similar applications such as in post-trade confirmations and matching. The benefits and advantages for clients are; 1) Ability to process in high volume, 2) Automation leave humans to deal with monitoring and exceptions, 3) greater accuracy (the AI does not get tired).

To become AI-driven, financial institutions must streamline their capability stack end-to-end across multiple layers. LPA offers AI-exploration workshops to prospects and existing clients where LPA specialist will deep dive into these various layers, starting from reimaging the client's engagement layer, developing decision making layers through advanced analytics and AI capabilities, core tech & data layer up to an agile operating platform layer.

Client layer (Client expects highly standardized & frictionless experience)	Decision making layers (Advanced Analytics	Agile operating platform
Core tech & data layer		

An AI driven financial institutions must have an agile culture, otherwise the is a high risk to fail. Secondly, it must have a platform-oriented operating model that is able react and respond fast as well as deliver solution at scale.

LPA is happy to accompany you along the journey.

ABOUT THE AUTHORS

Sandro has over 20 years of experience in the financial services industry where he held different senior functions in front, finance, risk, operations, IT and transformation. He was also a Partner for a Big4 where he built up the advisory, focusing on risk and performance. He founded AAAccell, a global Top100 AI-based Wealth- & RegTech company, and founded the Swiss Risk Association, the leading risk association in Switzerland. Sandro is/was also a lecturer at different Universities and a regular speaker at different venues, e.g. the keynote speaker at the first Machine Learning congress in Europe. Further, he published several articles and co-authored a Fintech book which was released globally.

Haris is a Wealth & Asset Management specialist and responsible for the Digital Transformation practice in Zurich. He has more than 8 years' experience in successfully delivering projects to launch new products/service offerings, implementing transformational change models effectively & efficiently, setting up change portfolios as well as mitigating operational risks with deadline driven ability to achieve bottom-line results. He holds a bachelor degree in Inf. Engineering from the Karlsruhe Institute of Technology (KIT).