Intelligent automation entering the business world

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Automation using artificial intelligence might be the next game changer in terms of process efficiency in the financial industry.

Robotic process automation or intelligent automation (the combination of artificial intelligence and automation) is starting to change the way business is done in nearly every sector of the economy. Intelligent automation systems detect and produce vast amounts of information and can automate entire processes or workflows, learning and adapting as they go. Applications range from the routine to the revolutionary: from collecting, analysing, and making decisions about textual information to guiding autonomous vehicles and advanced robots. It is already helping companies transcend conventional performance trade-offs to achieve unprecedented levels of efficiency and quality.

Until recently, robotics has found most of its applications in the primary sector, automating and removing the human element from the production chain. Replacing menial tasks was its first foray, and many organisations introduced robotics into their assembly line, warehouse, and cargo bay operations.

Now, tertiary sector businesses have already started to apply new technologies and the robotic paradigm to automate their processes and replace humans in low value-added activities. This is also the case in the financial services industry.

What is intelligent automation and to which processes is it applicable for bank, insurance or fund servicing industries?

Robotic process automation combines artificial intelligence—including natural language processing, machine learning, autonomics, and machine vision — with automation.

Artificial intelligence and automation are hardly new, but the technologies have progressed substantially in recent years. Advances in machine learning techniques, improvements in sensors and ever-greater computing power have helped create a new generation of hardware and software robots with practical applications in nearly every industry sector.

A useful definition of Artificial Intelligence (AI) is the theory and development of computer systems able to perform tasks that normally require human intelligence. Robotic Process Automation (RPA), a synonym to AI, is the application of technology allowing employees in a company to configure computer software or a 'robot' to reason, collect and extract knowledge, recognise patterns, learn and adapt to new situations or environments. RPA leverages recent software abilities made possible by breakthroughs in computing power, including natural language processing, machine learning, machine vision and speech recognition.

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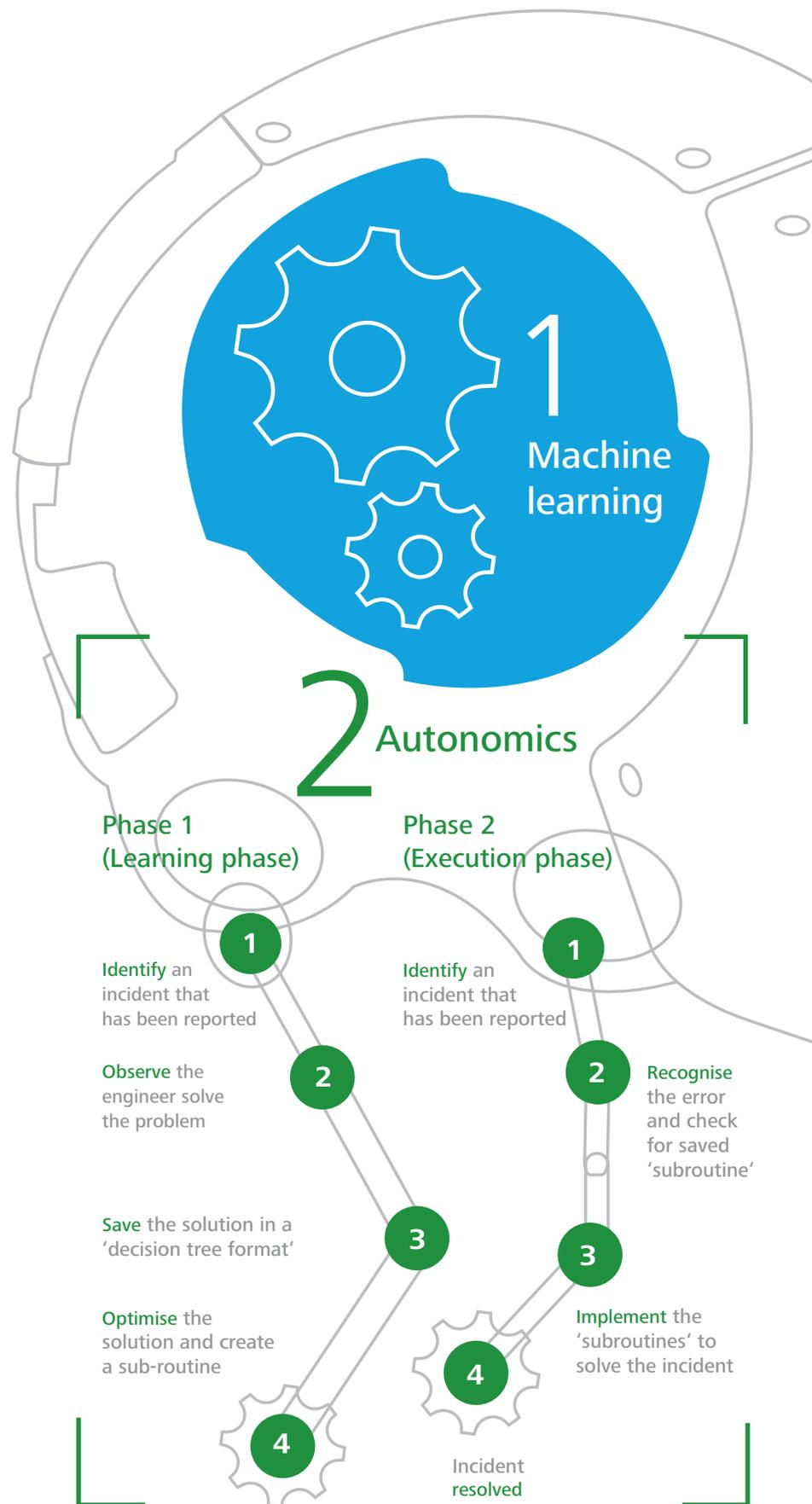
Machine learning refers to the ability of computer systems to improve their performance by exposure to data without the need to follow explicitly programmed instructions. At its core, machine learning is the process of automatically discovering patterns in data. Once discovered, the pattern can be used to make predictions.
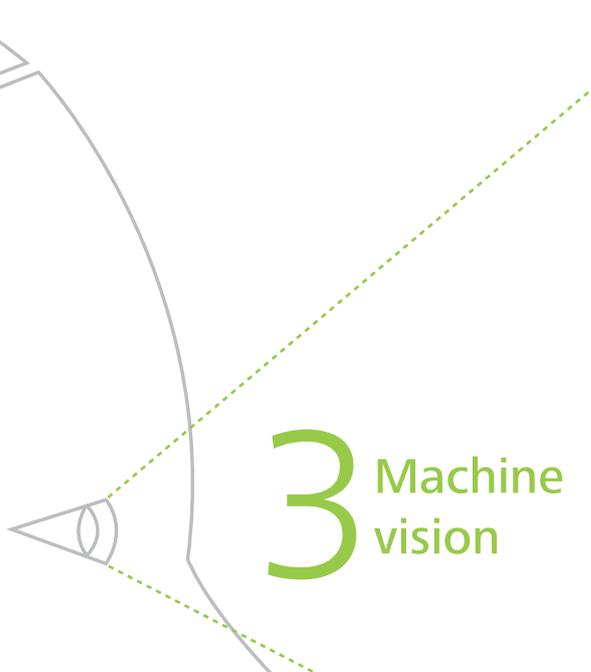
Applications of machine learning are very broad, with the potential to improve performance in nearly any activity that generates large amounts of data. Besides fraud screening, this includes sales forecasting, inventory management, oil and gas exploration, and public health.

For instance, presented with a database of information about credit card transactions, such as date, time, merchant, merchant location, price, and whether the transaction was legitimate or fraudulent, a machine learning system learns patterns that predict fraud. The more transaction data it processes, the better its predictions are expected to become, to the point where it can predict situations just before they actually happen. Computing power and in-memory technologies now even allow algorithms to be applied to individuals and can detect when behaviour deviates from their usual consumer habits.

Autonomics refers to systems that are designed to perform routine tasks and operations performed by humans. The technology interfaces with existing applications for processing transactions and triggering responses. They are machine-learning software programmes that 'observe' the way a trained user takes decisions or resolves issues and replicate the same 'decision making' process to manage similar decision points or troubleshoot similar issues in the future, thereby eliminating the need for a human operator. Autonomics can be useful in back-office centres performing high volume, rules-based work. It can perform these tasks round the clock at a fraction of the cost of a human resource without any manual errors, maintaining or mitigating processing risk. Industry analysts predict this technology will completely transform the Business Process Outsourcing (BPO) industry.

The system goes through two phases—the learning phase and the execution phase—as it learns to solve decision points and incidents. The diagram below summarises the steps included in these two phases.

1 Machine learning

2 Autonomics

Phase 1 (Learning phase)

1 Identify an incident that has been reported

2 Observe the engineer solve the problem

3 Save the solution in a 'decision tree format'

4 Optimise the solution and create a sub-routine

Phase 2 (Execution phase)

1 Identify an incident that has been reported

2 Recognise the error and check for saved 'subroutine'

3 Implement the 'subroutines' to solve the incident

4 Incident resolved

3 Machine vision

Machine vision or computer vision refers to the ability of computers to identify objects, scenes and activities in images. Computer vision technology uses sequences of imaging-processing operations and other techniques to break the task of analysing images down into manageable pieces. There are techniques for detecting the edges and textures of objects in an image, for instance. Classification techniques may be used to determine if the features identified in an image are likely to represent a kind of object already known to the system.

A well-known use of computer vision is the face-recognition software used by Facebook to identify people in photographs, or by security and surveillance to spot suspects. *"Another example is the online rent out lodging platform Airbnb, which uses NLP to understand and analyse reviews, descriptions and interactions between users on the marketplace. Further it uses computer vision methods for image content analysis: classification, quality, attractiveness, similarity, and extraction of features for ranking models."*

Another example: to inspect the security features of new US$100, US$50, and US$20 bills such as micro-printing, watermarks and fluorescing security threads, the US Bureau of Engraving and Printing (Washington, DC) has implemented imaging inspection techniques to ensure the quality of the banknote printing process. Banks can also use the same techniques to detect forged notes deposited in ATMs or PoS (Point of Sale) terminals. This is just one step away from performing blacklist checks not on names but rather on scanned individual portrait pictures taken directly by the PoS terminal using a camera against a central picture database. This will be even more accurate than the existing name matching techniques largely based on fuzzy algorithms.

4 Natural Language Processing (NLP)

Natural Language Processing (NLP) is the ability of a computer to interpret human language and take appropriate action. One of the most well-known applications of such technology is Siri® for the iPhone, although other smartphone platforms also have their own equivalent mobile app, such as Maluuba for Android. Applications for this technology can also be found in financial services.

Indeed, considering that markets are greatly influenced by news from famous sources such as central banks, magazines and recognised bloggers or Twitter users, the financial industry has already started to consider NLP as a way to automate trading strategies. Specialised software analyses pieces of news such as announcements about corporate profits (or lack thereof), a change in corporate management, a change in monetary policy from a central bank, talk of a takeover, or any kind of event that could cause a company's share price to move wildly up or down. The software leverages the information and acts upon it by selling or buying the associated financial instrument.

Insurance companies also monitor social media to detect fraud. Information collected by NLP software is cross-referenced with claim reports to detect fraudulent accident declarations, for instance.

Autonomics can be useful in back-office centres performing high volume, rules-based work

AI is expected to have a major impact on the world of work. It can complement human input in complex work requiring creativity and judgement, and will likely increasingly act as a substitute for routine labour. We are beginning to see task assistants and associate systems that, with the right interface, allow humans to delegate work to a computer.

How can robotic process automation improve process efficiency in the financial industry? Which processes are the best candidates?
Business process management and rule engine software are the basis of most current process automation initiatives. These technologies enable organisations to model their processes and have a computer orchestrate them by taking decisions on where to direct flows at subsequent steps. These technologies are already quite powerful in terms of industrialising processes and managing business rules. However, they need to be configured, are very systematic and therefore cannot adapt to change. Any situation not accounted for during configuration is an exception requiring human intervention. With those technologies, you gain efficiency by having the process—or part of it— executed by a computer, making speed and most likely cost gains.

With intelligent automation technologies, processes become increasingly intelligent. They can adapt to change and become more precise with time and with the quantity of data processed to the point where human input is needed only in very exceptional situations.

Figure 1: Possibilities and limitations of current—AI technologies compared with more traditional technics

		Possible with current technology	Possible with artificial intelligence
	Technologies	Combination of: • Business process management software • Rule engines software	Combination of: • Natural language processing software • Machine learning • Machine vision
	Configuration	• Pre-defined	• Dynamically self-adaptable • Use only an initial set of rules to initiate the process
	Human interface	• Uses forms to collect data	• Interprets human language (verbal or written) • Interprets pictures and videos
	Scope	• Can cover the whole process as long as it is modelled	• Currently limited to specific portions of specific processes
	Residual human intervention to handle exceptions	• Steady over time without reconfiguration	• Decreases over time

So what are the benefits for banks and insurance companies?

Banking and insurance are becoming commoditised industries. In order to attract and retain clients, banks and insurance businesses are focusing a lot of attention on the front-end and on improving the customer experience, deriving a single view of the customer and their transaction history, and ensuring that customer's interactions with the bank are satisfactory regardless of the channel.

However, back-end operations still require a lot of human support, despite not being revenue-generation areas. There is obviously room for improvement here, especially considering that, in essence, back-office tasks do not require direct interaction with customers and can be performed more efficiently and effectively off-site or by robots.

Why have back-office processes not yet been automated? Mainly because banks and insurance companies have rarely taken the time to review their procedures and have built complex core transactional platforms. Also traditional V-model software development methodology and the software architecture onto which those legacy platforms are based do not allow for the quick introduction of new artificial intelligence technologies.

However, back-office is not the only area where intelligent automation can play an important role by helping to reduce costs and risks, and by performing more efficiently.
Machine learning software such as feedzai supports client onboarding, transaction monitoring, and fraud prevention by identifying patterns in behaviour that could indicate fraudulent payment activity. Speech recognition technology such as Fonetic is used to automate customer service telephone interactions and to verify the identity of callers.

NLP software such as FinGenius can also be used to interpret employee or client questions—asked by text or voice—about transactions, compliance, software support or any other area of expertise, with the software proposing an answer.

Artificial Intelligence Research (AIR) applies AI techniques to solve policy portfolio optimisation problems for the insurance industry using a branch of AI known as Reinforcement Learning (RL). As the examples above show, the potential business benefits of artificial intelligence technologies are much broader than the cost savings that may be implied by the term 'automation'.

They include:

- Faster actions and decisions (e.g. for fraud detection)

- Better outcomes (e.g. for portfolio optimisation)

- Greater efficiency (i.e. better use of highly skilled people or expensive equipment)

- Lower costs (e.g. reducing labour costs with automated telephone customer service)

- Greater scale (i.e. performing large-scale tasks impractical to perform manually)

- Product and service innovation (from adding new features to creating entirely new products)

Some case studies on the use of intelligent automation

Genworth Financial[1]

Automates the underwriting of Long-Term Care (LTC) and life insurance applications by relying heavily on artificial intelligence techniques. A fuzzy logic rules engine encodes the underwriter guidelines and an evolutionary algorithm optimises the engine's performance. A natural language parser is also used to improve the coverage of the underwriting system.

UBS Group AG[2]

Uses artificial intelligence for help when delivering personalised advice to the bank's wealthy clients by modelling 85 million Singaporean individuals' behavioural patterns. Fine-tuned for financial services, the technology allows Sqreem (Sequential Quantum Reduction and Extraction Model) to build a profile of an individual showing potential match-ups with different types of wealth management products.

Goldman Sachs[3]

Has entered a strategic partnership to use Kensho's real-time statistical computing and analytics technology across the firm. Kensho's intelligent computer systems are capable of answering complex financial questions posed in plain English, and in real-time, achieving speed, scale, and automation of previously human-intensive knowledge work.

BBVA[4]

Selected Fonetic to support their Trading Record Keeping Compliance solution. Other banks also use NLP software to monitor internal communication and identify potential misconduct. According to a report by the Financial Times, some banks have also begun monitoring traders' performance against the number of times they use internal communications systems in order to identify whether traders are covertly contacting clients and illegally profiting from doing so.

1 AI Magazine Volume 27 Number 3 - Automating the Underwriting of Insurance Applications

2 http://www.bloomberg.com/news/2014-12-07/ubs-turns-to-artificial-intelligence-to-advise-wealthy-clients.html

3 http://www.prnewswire.com/news-releases/goldman-sachs-leads-15-million-investment-in-kensho-300000102.html

4 http://fonetic.com/customers/

How can your organisation apply cognitive technologies?

As we have seen, the range of business problems to which intelligent automation can be applied is expanding as technologies for voice recognition, natural language processing and machine learning improve and become usable by non-specialists. These technologies are increasingly available as open source or low-cost products or cloud-based services. However, for the most part they can only replace humans in tasks peripheral to the core processing platform.

For back-office operation, banks and insurance companies have very few options; they can only replace or heavily overhaul their core legacy platform. Both alternatives are long-term propositions but are necessary to ensure the organisation benefits from RPA at the core of its transactional platform.

If they choose to replace it, they should carefully select an appropriate solution that can be easily integrated with RPA technologies using some kind of service layer. In order to benefit as much as possible from the new system as regards automation, they will also have to adapt the processes to it rather than adapting the new system to the old way of working.

If they choose to overhaul it, they should componentise the architecture, factorise the components, review the processes, isolate, simplify and reduce the transactional platform to its core, and introduce a secure yet high-performance service layer to integrate it with peripheral systems and RPA technologies.

RPA technologies can and will be used in a lot of different process areas but there most probably will still be domains where software cannot replace humans, i.e. areas where a significant amount of creativity or intelligence are required, such as deal structuring. When regulations require that a human be in control of the financial review process, for instance, RPA can assist humans but will not take over. Obviously, RPA will not totally replace humans, as clients will be driven away if they can only interact with machines - or perhaps it is simply a question of attitudes and time.

The potential business benefits of artificial intelligence technologies are much broader than the cost savings that may be implied by the term 'automation'

Conclusion

- Automation using artificial intelligence is made possible by the combination of new types of software and recent breakthroughs in computing power

- Machine vision, speech recognition, natural language processing, machine learning and autonomics technologies can be combined to automate processes by interpreting facts, taking decisions and adapting to change

- These technologies are just beginning to emerge but are already available to replace humans in various tasks

- Business benefits are much broader than cost savings and include better use of highly skilled people or expensive equipment, faster actions and decisions, better outcomes, product and service innovation, etc.

- To benefit as much as possible from this technology, front to back, legacy core platforms will likely need to be overhauled or even replaced