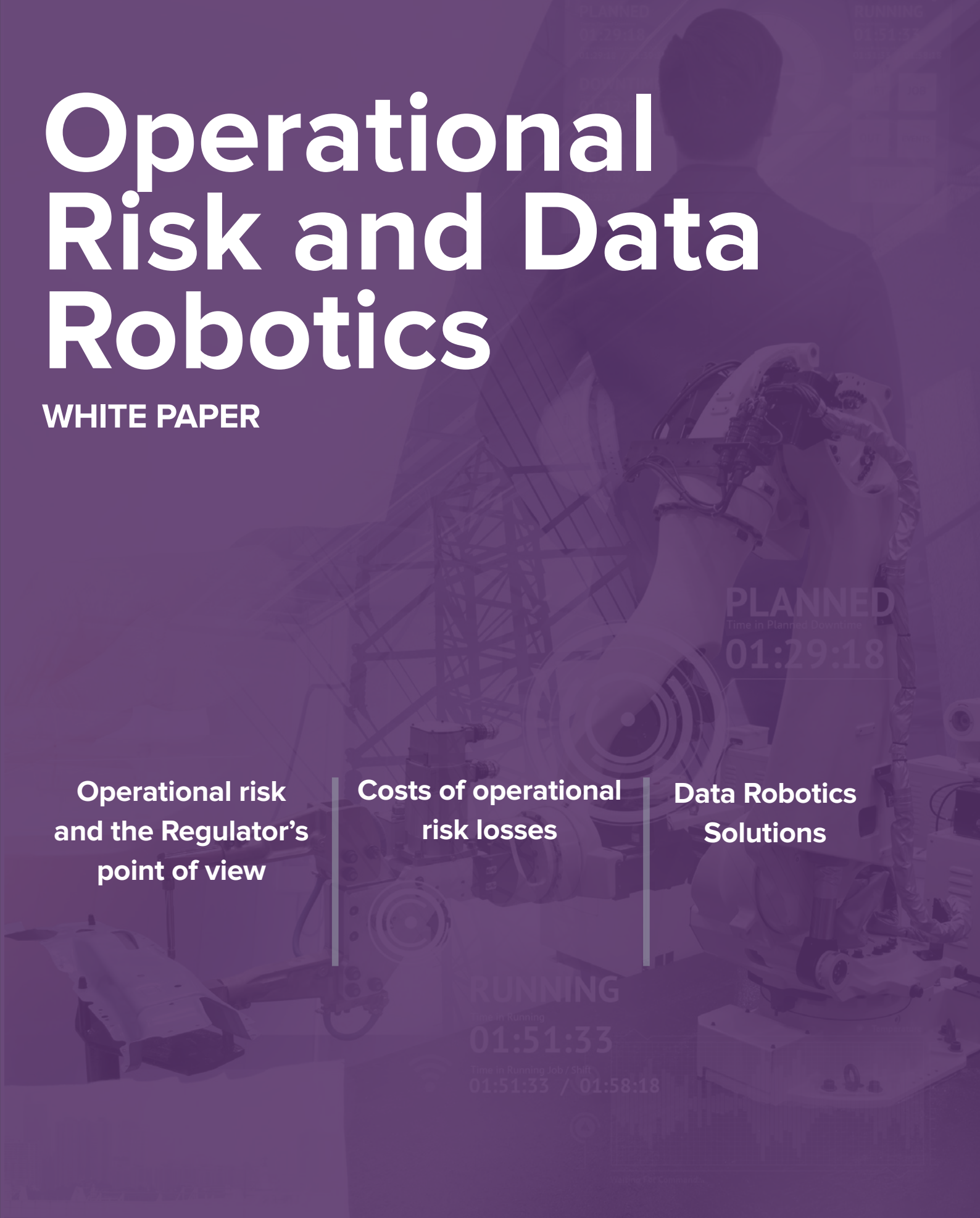
REPLY AVANTAGE

May 2017

Operational Risk and Data Robotics

WHITE PAPER



Operational risk and the Regulator's point of view

Costs of operational risk losses

Data Robotics Solutions

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Paolo Fabris is a Partner at Avantage Reply. He has over 18 years of professional experience in Financial Services. His focus has been on Regulatory projects and, in particular, on IAS/IFRS adoption in the banking system, Individual and Group Financial Reporting, Risk Management on both market and credit risk, Basel II and Basel III adoption, and M&A.

Paolo has focused his consulting skills in managing large and complex projects with particular attention to the main regulatory aspects and requirements. He led important projects and programs taking care of business analysis, organizational change, regulatory compliance and internal auditing. His extensive experience in risk management spans all types of risks and a broad spectrum of financial products.

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Francesca Terrizzano is a business analyst for Avantage Reply, with experience in Financial Services. Her focus is on risk management projects and specialising in Operations area and, in particular, business processes mapping and optimization, especially in terms of automation, in order to increase the quality of work, reduce the processing times, decrease operational risk and reputational risk and limit the necessity of resources for the day-to-day operations. She takes part in the Reply Community of Practice on Data Robotics for the purpose of identifying new business solutions able to meet the needs of a constantly evolving market. Francesca has a master's degree in Economics and Finance from Bicocca University of Milan.

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Roselisa Giuliano is a business analyst for Avantage Reply, with experience in the financial services industry, in particular on European banking regulation and risk management. She is focused in the ongoing transformation of banking business models, increasingly interconnected with the information technology. Roselisa participates actively in the Robotic Automation and Machine Learning project organized by Reply Group, such as Data Robotics Community of Practice and Hackathon, with the objective of building real accelerators for the market. Roselisa has a master's degree in Management and Business Innovation from Sapienza University of Rome.

Avantage Reply, part of the Reply Group, is specialised in Financial Services with a focus on Risk, Compliance, Treasury and Capital and Financial Performance Management. With offices in Amsterdam, Brussels, Frankfurt, Hamburg, Lisbon, London (head office), Luxembourg, Milan, Munich, Paris and Rome, Avantage Reply counts some of the world's most significant financial groups among its clients, including well-known and respected organisations in the Banking, Insurance, Investment Management and Services, and Post Trading Services sectors. The firm's delivery capabilities cover advisory services (Risk/Finance/Treasury Subject Matter Expertise), Program and Project Management, Business, Functional, and Data Analysis.

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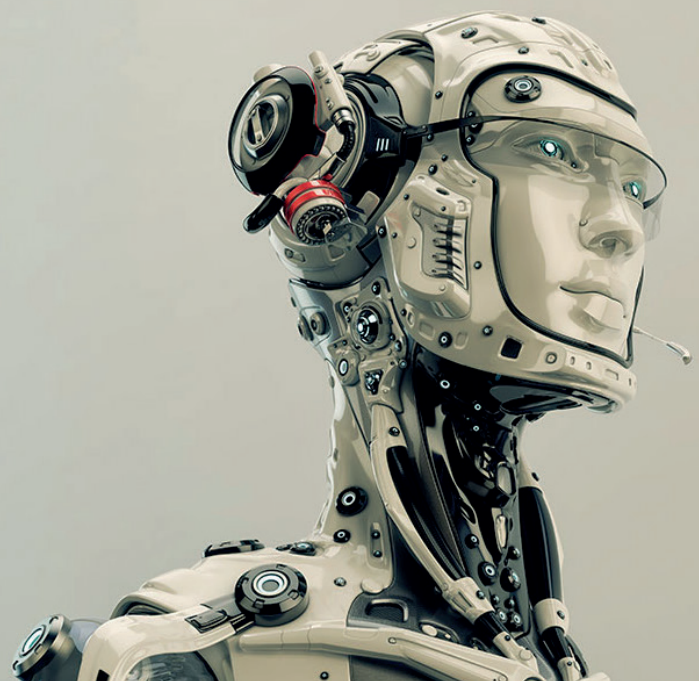
Introduction

Data Robotics Solutions are emerging as a highly effective, yet practical approach for banks to reduce operational risk, improve efficiency, reduce costs and derive additional value. From Robotic Process Automation, which enables repetitive tasks to be automated, to machine learning enabled Intelligent Process Automation, which allows “robots” to take over complex and highly skilled tasks; banks that have started implementing these solutions are reaping the rewards, both from a financial and compliance perspective.

This paper provides an overview of how Data Robotics Solutions can help banks manage and reduce operational risk, illustrated by case studies describing the practical benefits of this powerful new technology, as implemented by Avantage Reply.



Operational Risk: The Regulator's Point of View

Losses attributed to operational risk in recent years have resulted in increased focus by banks' risk management functions and heightened attention from regulators. A number of regulatory changes have been implemented in recent years, and there is more to come, including:

- A requirement to include and project operational risk information in regulatory stress testing processes (both the EBA and Bank of England exercises); and
- Proposed changes to operational risk capital requirements, which include removing the Advanced Measurement Approach ('AMA') and using its basic component (loss data collection) in the Standardized Measurement Approach ('SMA'), a methodology that implicitly values the management approach to operational risk and involves two main components:
  1) A Business Indicator Component ('BI'), representing the operational risk associated with the bank's business model; and
  2) A Loss Component, representing loss events over the last ten years.

While the latter change remains hotly debated among banks and even national regulators, regardless of the outcome, it serves to remind us of the importance of operational risk to a bank profitability and financial resilience.

In order to reduce operational risk capital requirements (approximately 10% of total Risk Weighted Assets ('RWA') for European commercial banks, as shown in Figure 2: Example of an EBA Risk Dashboard 3Q2016), and to therefore improve capital ratios, banks are incentivised to reduce the volume and magnitude of operational risk losses.

Figure 1: Drivers of new regulatory requirements

	CURRENT	SMA
SIMPLICITY	• Excessive complexity of AMA modeling • Potential increased complexity for banks with BIA and TSA related to data collection and data quality process	Reduced computation complexity due to: • the use of a "closed" algorithm for calculating regulatory capital • the absence of scenario analysis and external data use
COMPARABILITY	• Difficulty in comparing the capital requirements for operation risks due to the lack of homogeneity of the AMA approaches used	• Greater comparability in view of the application of the same algorithm to all banks, even with simplified methods • Greater ability of the regulator to identify and respond to potential systemic issues
RISK SENSITIVITY	• Little sensitivity to the actual exposure to operational risks for banks that use simplified methods BIA and TSA	• Increase in risk sensitivity by introducing specific Business Indicator Component focused on the business model of the bank and Loss Data

Figure 2: Example of an EBA Risk Dashboard 3Q2016[1]

% OF TOTAL RWA	RWA COMPOSITION															
	CREDIT RISK CAPITAL REQUIREMENTS (EXCL. SECURITISATION)				SECURITISATION CAPITAL REQUIREMENTS				MARKET RISK CAPITAL REQUIREMENTS				OPERATIONAL RISK CAPITAL REQUIREMENTS			
	DEC-15	MAR-16	JUN-16	SEP-16	DEC-15	MAR-16	JUN-16	SEP-16	DEC-15	MAR-16	JUN-16	SEP-16	DEC-15	MAR-16	JUN-16	SEP-16
AT	86.5%	85.9%	85.7%	86.5%	0.2%	0.2%	0.2%	0.3%	2.8%	3.0%	2.8%	2.3%	9.8%	10.2%	10.6%	10.2%
BE	82.3%	82.4%	82.5%	83.3%	2.0%	1.8%	1.6%	1.5%	2.9%	2.8%	2.7%	2.6%	7.5%	7.5%	7.5%	7.6%
BG	90.9%	90.8%	91.0%	90.7%	0.1%	0.1%	0.1%	0.1%	0.4%	0.2%	0.3%	0.4%	8.3%	8.7%	8.3%	8.5%
CY	88.0%	87.6%	87.6%	87.4%	0.0%	0.0%	0.0%	0.0%	0.8%	1.1%	0.5%	0.7%	11.0%	11.2%	11.5%	11.6%
CZ	83.1%	82.6%	82.8%	83.1%	0.0%	0.0%	0.0%	0.0%	3.4%	3.7%	3.5%	3.2%	12.7%	12.7%	12.8%	12.9%
DE	72.9%	72.4%	73.2%	73.8%	3.4%	3.4%	3.4%	3.2%	8.8%	8.9%	8.3%	7.7%	12.1%	12.7%	12.6%	12.9%
DK	81.1%	82.3%	83.7%	83.4%	0.2%	0.2%	0.2%	0.2%	9.4%	7.7%	6.2%	6.8%	8.4%	9.0%	9.2%	8.9%
ES	87.0%	86.8%	86.8%	86.8%	0.4%	0.4%	0.4%	0.4%	3.2%	3.4%	3.6%	3.5%	8.6%	8.5%	8.5%	8.6%
FI	82.7%	82.4%	82.8%	82.4%	0.2%	0.1%	0.1%	0.1%	5.8%	6.4%	5.9%	6.4%	8.9%	8.9%	8.9%	8.9%
FR	84.0%	84.1%	84.4%	84.5%	1.5%	1.3%	1.2%	1.2%	3.1%	3.1%	3.0%	3.0%	9.7%	9.7%	9.7%	9.7%
GB	69.0%	69.4%	69.6%	68.0%	1.4%	1.3%	1.2%	1.3%	12.0%	12.0%	11.8%	12.7%	10.8%	10.4%	10.4%	10.7%
GR	89.1%	89.2%	89.7%	89.5%	0.1%	0.1%	0.1%	0.1%	3.3%	3.1%	3.2%	3.3%	7.3%	7.3%	6.8%	6.9%
HR	87.0%	87.3%	87.5%	87.2%	0.0%	0.0%	0.0%	0.0%	2.5%	2.1%	2.1%	2.6%	10.2%	10.3%	10.1%	9.9%
HU	81.3%	79.8%	79.3%	78.9%	0.0%	0.0%	0.0%	0.0%	5.0%	5.7%	5.1%	5.5%	13.4%	13.8%	15.3%	15.3%
IE	90.4%	88.5%	88.5%	88.6%	0.6%	0.5%	0.5%	0.4%	0.6%	1.3%	1.2%	1.1%	6.5%	7.7%	7.8%	7.9%
IT	85.6%	85.6%	85.3%	85.4%	0.8%	0.8%	0.9%	0.9%	3.9%	4.0%	4.4%	4.2%	8.8%	8.8%	8.7%	8.8%
LT	89.4%	90.1%	90.3%	90.7%	0.0%	0.0%	0.0%	0.0%	1.7%	1.4%	1.5%	1.3%	8.8%	8.5%	8.1%	8.0%
LU	91.0%	90.8%	90.4%	90.3%	0.4%	0.5%	0.4%	0.4%	0.5%	0.5%	0.5%	0.6%	7.3%	7.5%	7.6%	7.8%
LV	86.2%	86.2%	86.6%	86.3%	0.0%	0.0%	0.0%	0.0%	1.7%	1.8%	1.5%	1.6%	12.1%	12.1%	11.9%	12.0%
NL	82.4%	82.1%	82.2%	82.0%	0.9%	0.9%	0.9%	0.8%	2.2%	2.6%	2.4%	2.2%	12.9%	12.9%	13.0%	13.4%
NO	73.0%	72.0%	73.4%	71.9%	1.0%	1.0%	0.9%	0.8%	1.2%	1.1%	1.1%	1.0%	7.4%	7.6%	7.5%	7.6%
PL	90.3%	89.9%	90.6%	90.7%	0.0%	0.0%	0.0%	0.0%	2.1%	2.6%	2.4%	2.4%	6.7%	6.7%	6.5%	6.5%
PT	88.6%	88.1%	88.1%	88.0%	1.1%	1.2%	1.2%	1.1%	2.9%	3.4%	3.5%	3.5%	6.0%	6.1%	6.1%	6.1%
RO	81.4%	79.1%	78.7%	78.9%	0.0%	0.0%	0.0%	0.0%	5.4%	5.7%	6.2%	5.7%	12.9%	14.9%	14.8%	15.1%
SE	81.3%	81.1%	81.7%	81.6%	0.2%	0.1%	0.1%	0.4%	4.7%	4.6%	4.3%	3.9%	11.6%	11.7%	11.5%	11.7%
SK	87.8%	86.9%	86.2%	85.5%	0.0%	0.0%	0.0%	0.0%	0.9%	0.8%	1.1%	1.2%	10.3%	11.0%	11.6%	12.0%
EE*	N.A	89.8%	90.2%	90.3%	N.A	0.0%	0.0%	0.0%	N.A	0.4%	0.4%	0.4%	N.A	9.7%	9.4%	9.2%
SI	86.7%	87.1%	87.2%	87.0%	0.0%	0.0%	0.0%	0.0%	1.5%	1.4%	1.1%	0.0%	11.7%	11.5%	11.7%	11.8%
MT	89.4%	89.5%	89.7%	90.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	10.4%	10.3%	10.1%	9.0%
EU	79.0%	79.0%	79.3%	79.1%	1.3%	1.2%	1.2%	1.2%	6.4%	6.4%	6.3%	6.3%	10.1%	10.1%	10.0%	10.2%

[1] European Banking Authority, risk dashboard - data as of Q3 2016, p. 27, available at: http://www.eba.europa.eu/documents/10180/1715099/EBA+Dashboard+-+Q3+2016.pdf/4bb3d58c-a0ef-49e5-8129-6576a4b886f4

According to a recent paper from Harvard Business School on Operational Risk[2]:

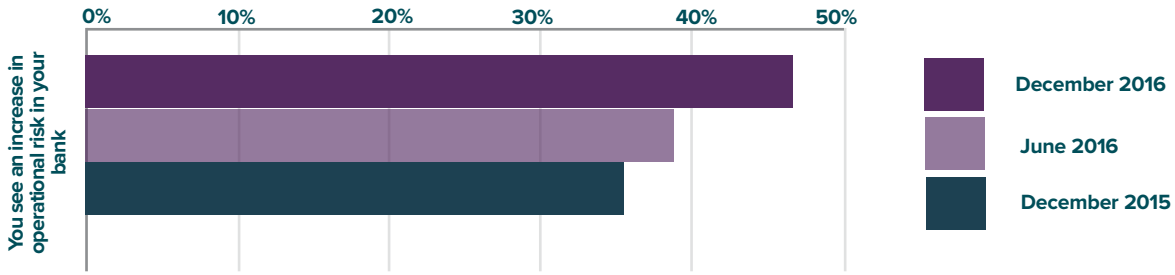
- For G-SIBs – the average percentage of RWA for operational risk is 15% (higher than the EBA statistic of 10%);
- The range of these percentages is about 45% to 5%;
- The proportion of operational RWA to total RWA has risen 50% from 2008 to 2015;
- Of the types of operational risks, 75% are 'regulatory' related.

European Systemic Risk Board ('ESRB') research on misconduct risk in the banking sector, conducted from 2009 to 2014, shows that regulatory bodies have imposed fines of 200 billion euros, both in the form of sanctions and business restrictions. These fines are in relation to bank misconduct and its effects on financial stability.

Figure 3: Cumulative misconduct costs[3]

Furthermore, to take an example of one sizeable banking market within the EU, a recent Bank of Italy survey has shown that approximately 50% of all banks perceive an increase in operational risk in their institution, up 10% from only six months prior.

Figure 4: Operational risk across the Italian Banking Sector[4]



[2] Harvard Business School, Rethinking Operational Risk Capital Requirements, available at: http://www.hbs.edu/faculty/initiatives/behavioral-finance-and-financial-stability/Documents/2016-06%20Rethinking%20Operational%20Risk%20Capital%20Requirements.pdf

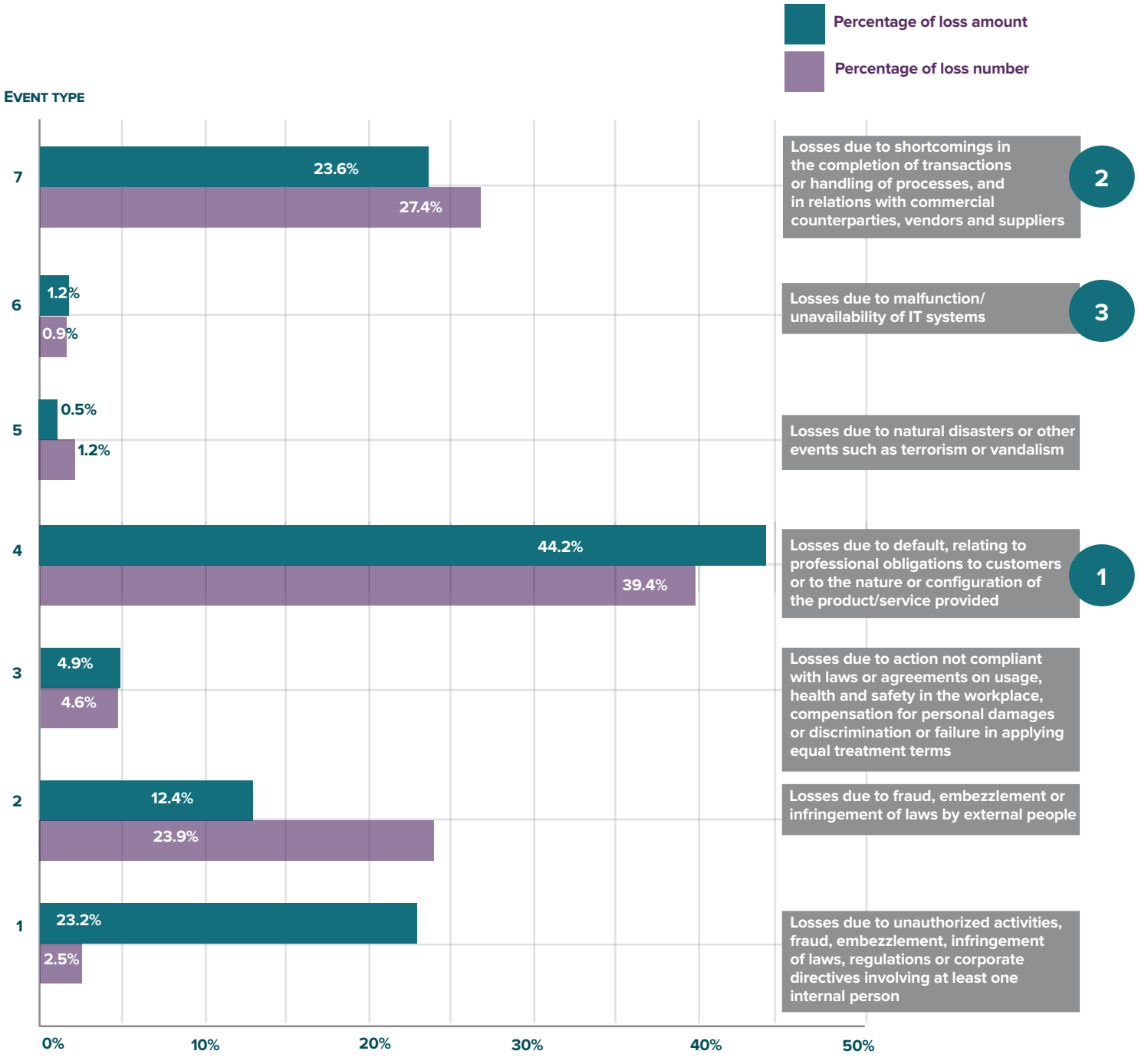
[3] European Systemic Risk Board, Report on misconduct risk in the banking sector, p. 12, available at: http://www.esrb.europa.eu/pub/pdf/other/150625_report_misconduct_risk.en.pdf

[4] European Banking Authority, Risk Assessment Report_December 2016, p.53, figure 59, available at: http://www.eba.europa.eu/documents/10180/1315397/EBA+Risk+Assessment+Report_December+2016.pdf

Costs of Operational Risk Losses

Due to the broad and typically sensitive or confidential nature of operational risk losses, it is challenging to achieve full visibility of the distribution of losses. However, staying with the Italian example, "DIPO", the Italian Operational Risk Losses Database, contributed to by 33 banking groups, gives a good indication, as shown below.

Figure 5: Distribution of operational risk losses in Italian banks over the course of 2016[5]



[5] Database Italiano Perdite Operative, Standard Report, p.2, available at: http://www.dipo-operationalrisk.it/Downloads/Report%2002SE2014%20ENG.pdf

Some themes are apparent from the above analysis, including that:

- The largest share of losses (44%) derive from non-fulfilment of client obligations and the configuration of the product/service provided;
- The second largest source of operating risk losses for banks (23.6%) come from failures in the completion of transaction processing or process management and the relationships with trade counterparties, vendors and suppliers; and
- The number of cases where losses stem from failure/unavailability of computer systems is relatively small.

UK bank have a similar operational risk profile. In Figure 6: UK Operational risk capital as a proportion of total capital requirements below, RWA is £326.5 billion and a persistantly growing percentage of total RWA (reaching nearly 11% by the end of 2016).

Figure 6: UK Operational risk capital as a proportion of total capital requirements (Source: Bank of England)[6]

	2015	2016			
2016	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Total RWA (£ billions)	2,997	3,116	3,213	3,112	3,092
RWA Operational Risk (£ billions)	315	319	329	327	331
Total RWA (%)	10.5	10.24	10.24	10.51	10.71

Also, in terms of the split of sources of operational risk, an analysis of Pillar 3 reports from the large UK banks reveal that a significant proportion (at least a fifth but in some cases, well over half) stems from "Execution, delivery and process management".

Given the significant and increasing effect of operational risk losses on banks' profitability and balance sheet/capital positions, automation of processes and improvement in the control of existing processes, should be high atop management's priorities for risk mitigation. Our approach, as described in the next section, does not require fundamental changes in IT architecture or a multi-year transformation programme. Rather, it relies on overlaying innovative and accessible technology to achieve quick and effective, risk reducing and value creating automation.

6 Bank of England, Statistical release, Banking sector regulatory capital: 2016 Q4, 28 March 2017, available at: http://www.bankofengland.co.uk/pra/documents/regulatorydata/capital/2016/dec/bsrcrelease1612.pdf

Data Robotics Solutions

WHAT IS DATA ROBOTICS?

We define **Data Robotics** as the *set of technologies, techniques and applications necessary to design and implement a new level of process automation based on self-learning technologies and Artificial Intelligence ('AI'), aiming to improve productivity and efficiency in business processes*. The Data Robotics includes both Robotic Process Automation ('RPA') and Intelligent Process Automation ('IPA').

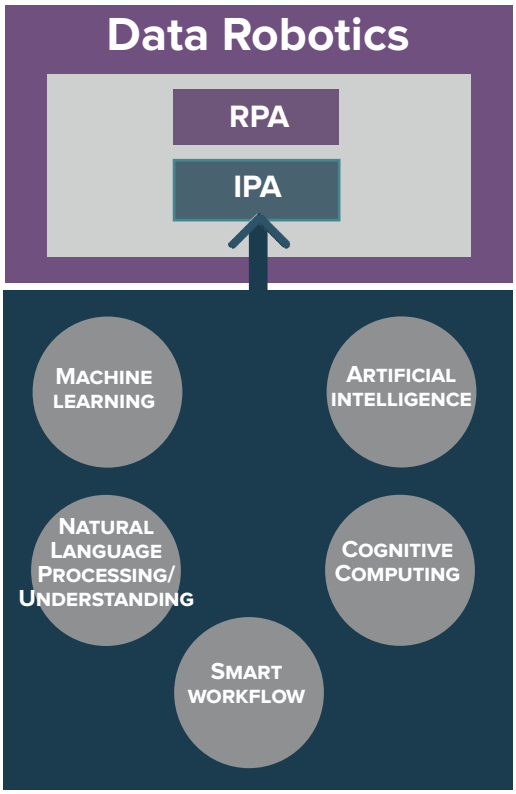
RPA enables increased quality, efficiency and productivity through the automation of **repetitive and manually intensive tasks**. Essentially, RPA entails a virtual machine that drives existing application software in the same way that a user does. This means that, unlike traditional applications, RPA software operates and orchestrates other application software through the existing application's user interface, providing **increased value and reduced costs** at the same time.

An area where this concept is being successfully applied is in the world of end-user Business Process Outsourcing providers ('BPOs') seeking to automate shared services centres and back office processes that involve high volume, repetitive and rules-based work.

IPA is essentially RPA supported by "smart" technologies, moving from applications that perform regular and recurring tasks to new solutions underpinned by a **machine learning** ('ML') approach. This enables Data Robots to develop new knowledge, make decisions, and provide judgements and feedback. **It allows robots to behave 'as humans' – adaptable and capable of independent decision making.**

Below is a conceptual representation of the above:

Figure 7: Simplified representation of Robotic Process Automation



The main components that contribute to RPA and IPA solutions include:

- **AI, self-teaching:** technologies that enable the development of software or a "robot" to automate processes that are recurring and based on rules. Adjustments are possible, but technologies execute only the task for which they have been set up.
- **ML and pattern recognition:** algorithms that can learn from data and make predictions, enabling technologies to become more intelligent over time.
- **Cognitive computing:** computers built to mimic the functions of humans and learn from them. Cognitive computing can help humans by making judgements and giving feedback, which supports decision-making processes. These are self-teaching systems that use natural language processes and image recognition.

Figure 8: Cognitive computing

Data Robotics Solutions increase process efficiency, with consequent reduction of costs, uplift in the degree of scalability and enhanced monitoring possibilities. This enhances management's level of assurance over compliance with regulation.

And importantly, less production time through efficiency gains can be replaced by more time analysing, generating insights and enhancing business decision making.

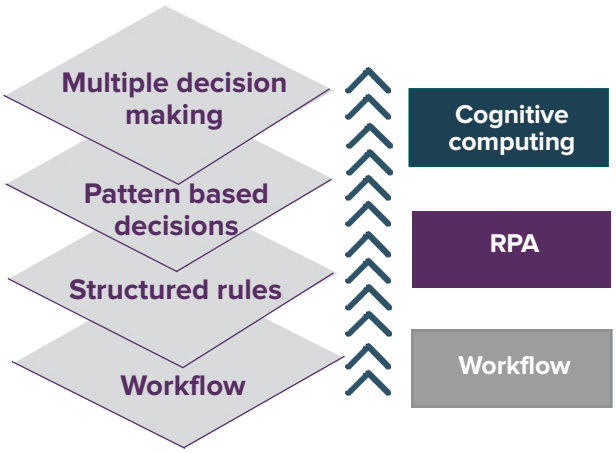
Data Robotics applied to operational risk management enables risk managers to 'do more with less', as outlined below.

WHAT MAKES IT WORK AND WHAT IS THE IMPACT?

Data Robotics employs the power of multiple decision making (the use of multiple data sources, learning based on statistics, natural language recognition and meaning comprehension) through:

- the automation of single/macro applications;
- the creation of structured rules; and
- the identification of pattern based decisions, as illustrated in Figure 9: Identification of pattern based decisions, below.

Figure 9 : Identification of pattern based decisions

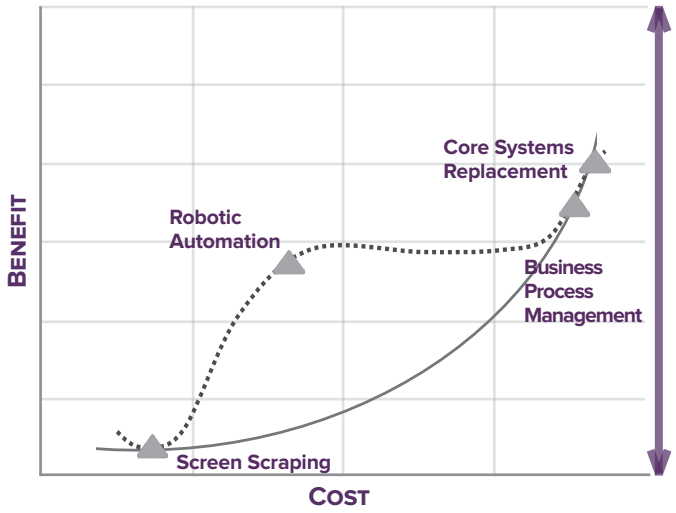


Data Robotics offers great possibilities in cost saving and efficiency improvements as well as data and knowledge management. It has the potential to be a catalyst for changes to banks' business models by empowering management to make radical improvements in strategic processes and ultimately, their customer offering and experience.

For example, as Data Robotics solutions enable mass automation of back office processes, lending and trading activities by the front office are able to modernise, as are middle office risk functions. Banks who adopt these technologies have the capability to rapidly launch new products and to compete more effectively with new entrants (while achieving the side-benefit of a more carbon-neutral or paperless work environment).

The economics of the **typical automation benefits curve**, as illustrated below, are also altered, forcing banks to re-evaluate the merits of outsourcing and insourcing solutions, due to the influence of RPA and ML.

Figure 10 : Typical automation benefits curve



The immediate benefits of RPA can be summarised as follows:

- **Cost reduction:** Robotic FTEs ('rFTEs') are typically a third of the price of an off-shore FTE;
- **Efficiency:** rFTEs can operate '24/7' without breaks or vacations (one rFTE typically replaces at least two traditional FTEs and sometimes as many as three to five);
- **Accuracy:** Human FTEs make data entry mistakes, transpose numbers, skip steps in processes, etc. while rFTEs can perform the same task in the same way every time; and
- **Improved audit and regulatory compliance:** Every robotic process transaction allows a detailed and automated audit log enabling the use of advanced business analytics and improved compliance with regulation.
- **Business value:** Efficiency gains and more powerful analytical capability enhances business insight and decision making capability, creating real value.

WHERE AND WHEN CAN IT BEST BE USED?

Data Robotics Solutions are effective for individuals, groups and organisations that perform structured, repeatable, computer-based tasks. They are also valuable for those who make complex decisions based on algorithms, those who must access more than one system to complete a process, and those who use workflow-enabled interaction with people and who search for, collect and update information.

Robotic Process Automation Solutions are best applied to:

- Processes with poor/non-existent coverage in terms of banking information systems;
- Time intensive activities, with low added value;
- "Closed" processes in which changes are not required or anticipated; and
- Processes that are either outsourced or designed to be outsourced.

RPA solutions should have a low implementation cost and require minimal maintenance. They must also be easily scalable and modifiable, in order to cater to instances where changes or extension of processes is required.

Intelligent Process Automation (Machine Learning) Solutions are best applied where:

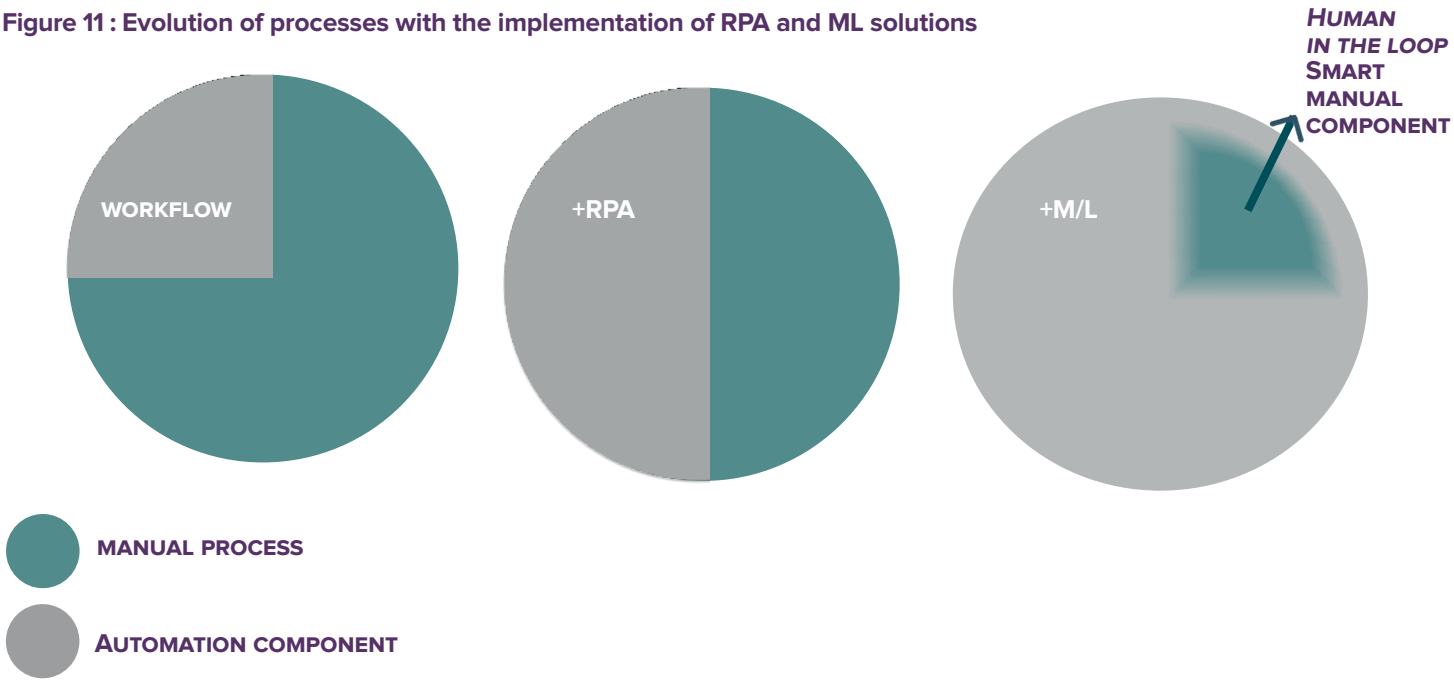
- It is productive to identify useful suggestions about a situation to be investigated in a 'counter-intuitive' or unconventional manner;
- The analysis of large volumes of data can add value; and
- The processes to be analysed are not enclosed in "pre-set" schemes, but can be "interpreted" on the basis of the experience gained by self-teaching software.

Machine learning solutions allow for the integration of process that would be excessively complex or inconvenient to be automated using RPA solutions.

A comprehensive approach, integrating RPA and IPA/ML solutions is most effective for Data Robotics technologies, as shown in Figure 11: Evolution of processes with the implementation of RPA and ML solutions. A comprehensive approach involves aggregating and, if necessary, integrating the different approaches, with a residual human contribution (the so-called "human in the loop").

The function of the human in the loop is for situations where implementation of automated solutions would not be cost-effective or would not provide total coverage of the processes involved. This methodology allows RPAs to work with large volumes of data in an automated fashion, as well as identifying events, issues and solutions using machine learning.

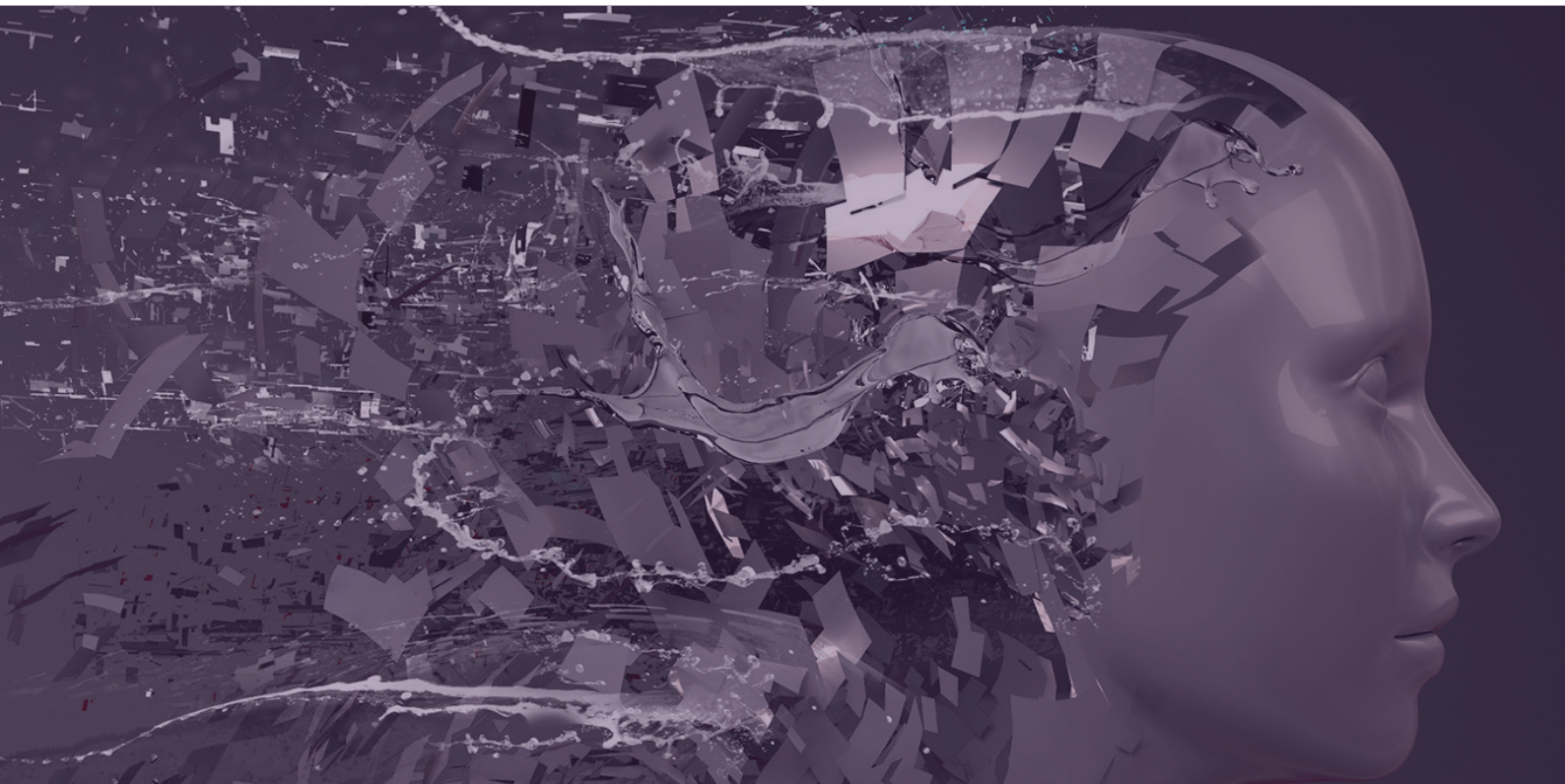
Figure 11 : Evolution of processes with the implementation of RPA and ML solutions



Conclusion

Since the regulators have drawn attention to the significance of operational risk and operational risk losses, banks have renewed their efforts to comply with regulatory requirements and supervisory expectations. In particular, banks are looking to reduce their operational risk capital charges and therefore improve capital ratios. To this end, banks are focusing on reducing incidents of processing errors and other operational risk events by improving the robustness and efficiency of business processes.

Data Robotics solutions are highly effective and practical approaches to reducing costs, improving efficiency, tightening controls and generating business value. It is a disruptive technology, which can reduce errors by orders of magnitude, while reducing processing time and giving greater assurance over compliance with regulation. By implementing Data Robotics solutions, banks can find themselves on the right side of the regulatory direction of travel and better able to reduce operational risk losses and the consequent drag on profitability (including through capital requirements).



Case Studies

The below case studies describe banking activities and processes that are already managed using Data Robotics solutions, successfully implemented by Avantage Reply.

1) Stress testing

Customer: A major European institution's stress testing function.

Challenge: Stress tests involve sourcing and integrating multiple data files from various business units, legal entities and departments. A number of complex calculations need to be applied to this data and relationships between different types of data need to be accounted for (e.g. changes in the unemployment rate and mortgage NPLs). Stress testing can be a highly time-consuming, cumbersome and inefficient process, with staff assigned to chasing colleagues for data file submissions and others responsible for solving the sequence of tasks to be conducted given the dependencies between files and inconsistencies between submissions (data quality issues).

For the above reasons, our client requested that a Data Robotics solution be implemented to streamline the stress testing process, reduce processing time and expenditure and to improve accuracy.

Solution: A Data Robotics solution was implemented that allowed users to execute stress testing processes, verify that required data files have been submitted and to ensure that tasks are performed in a logical sequence, allowing for dependencies.

Results: After application of the solution, the process was streamlined, leading to a 40% reduction in processing time, a decrease in the number of FTEs required and lower operational risk. At present, business users are able to execute monthly stress tests without any requirement for programming knowledge or IT support.

2) Registry clean-up

Customer: A major European bank's counterparty risk team.

Challenge: The ECB had requested that data quality issues in the bank's counterparty register be remediated. These data quality issues had come to light during the 2014 Asset Quality Review ('AQR').

Cleaning the counterparty registry would a manual, labour-intensive and slow process, so the client requested a Data Robotics solution to streamline the approach and reduce the processing time.

Solution: A Data Robotics solution was implemented to clean the counterparty register. Actions performed included processes to decouple counterparties (as labelled by their unique counterparty identifiers) from groups, where groupings of legal entities were inaccurate as well as the merging of counterparties into correct groups of legal entities.

Results: This registry cleaning process was streamlined through the use of Data Robotics Solutions, with a dramatic reduction in processing time and the successful closing of the ECB finding prior to the required deadline. This solution also allowed for a reduction in the number of FTEs allocated to the projects and a fall in the level of operational risk. By having a much higher level of data quality in the counterparty register, there were knock-on improvements in the accuracy of information used by risk management.

3) Treasury activities for public entities

Customer: A large European bank's (G-SIB) team that deals with the data entry, payment mandates, balance sheets and salary payments for approximately 1,300 public entities.

Challenge: The processes involved were highly manual, including both electronic and paper documents and a very large number of FTEs. The client requested a Data Robotics Solution that would be able to 'read' data from different document types and enter this into bank software systems.

Solution: A Data Robotics Solution was implemented, able to read all documents (with the exception of handwritten documents), recognise information pertinent to the bank and transcribe this information into bank software systems (covering payment mandates, balance sheets and salaries of public entities).

Results: As a result of this solution, the process was made more efficient, with a consequent fall in processing times, FTE resource requirements and operational risk. Furthermore, with the removal of repetitive data entry work, there was an increase in employee morale.

4) Refund of employee loan repayments

Customer: A major European bank's team responsible for managing repayment requests from customers regarding employee loans.

Challenge: The team deals with a large number of daily requests, with a great deal of similarity in the tasks performed. The customer asked for a Data Robotics solution to be implemented that would be able to eliminate the requirement for human input into this operation, with adequate controls to ensure the accuracy of the output.

Solution: A Data Robotics solution was implemented that is able to recognise information relevant to customer requests, whether communicated in the body of emails sent to the bank or in attachments. This data is then uploaded into relevant bank software systems.

Results: A single resource is now required to monitor the Data Robotics solution, with the rest of the FTEs having been re-assigned. SLA requirements are now being completely satisfied and there has been a fall in operational risk and processing times.

5) Factoring: Credit acknowledgements

Customer: The team responsible for factoring-related credit acknowledgements in the back office of a major European bank.

Challenge: The management of credit acknowledgments is both repetitive and labour-intensive. The client requested a Data Robotics solution to remove the human element from this process, with a control framework to ensure that the output is of high quality.

Solution: The Data Robotics system implemented performs automated matching between the payments declared by factoring clients of the bank and those of the counterparties of these clients.

Results: The process was automated to the extent that only one FTE was required to monitor the process, with operational risk and processing times greatly reduced.

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