Henley Business School
UNIVERSITY OF READING

CAPCO

JOURNAL

THE CAPCO INSTITUTE JOURNAL OF FINANCIAL TRANSFORMATION

AUTOMATION

Understanding robotic process automation (RPA)

MARKUS ALBERTH | MICHAEL MATTERN

AUTOMATION

Henley Business School – Capco Institute
Paper Series in Financial Services

#46
11.2017

THE HENLEY MBA

Realise your potential with an MBA
from a triple-accredited business school.

hly.ac/the-henley-mba

Henley
Business School
UNIVERSITY OF READING

Where business comes to life

AACSB ACCREDITED

EFMD EQUIS ACCREDITED

ASSOCIATION OF MBAS ACCREDITED

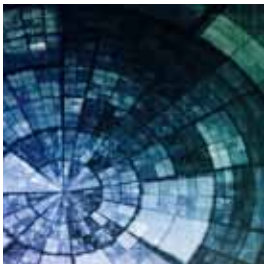
JOURNAL

THE CAPCO INSTITUTE JOURNAL OF FINANCIAL TRANSFORMATION

RECIPIENT OF THE APEX AWARD FOR PUBLICATION EXCELLENCE

CONTENTS

AUTOMATION



BUSINESS MODELS

INVESTMENTS

Understanding robotic process automation (RPA)

MARKUS ALBERTH | Managing Principal, Capco
MICHAEL MATTERN | Managing Principal, Capco

ABSTRACT

Robotic process automation (RPA) is the use of software as "virtualized workforce" to operate applications like a person processing a transaction or completing a process in front of a computer screen. Currently, the logic is still mainly rule-based and robots can relieve workers to do routine process work. In the near future, artificial intelligence will enable software robots to automate more and more work of humans with respective social and financial implications. With already over 50 providers, the market gains speed and volume, and innovation will lead to increasingly fragmented segments. In light of related and competing automation approaches, RPA has prominent benefits and typical caveats, such as quick and predictable cost cuts and scalable near real-time service potential. They translate into elements of a potential business case. Real business scenarios suitable for RPA show that it is working. The implementation of an RPA solution has at least three phases, the proof of concept, the pilot, and the leverage phase to other use cases within the company. If not done well, robots may be too slow, too expensive, and introduce too much complexity. A neutral partner with professional knowhow can neutralize these risks. In addition, the benefits of RPA can most probably be harvested earlier; making it right from the beginning. Whatever you think about robots: robots and RPA are here to stay. Robots are cheap and best in data processing, consequently, they will impact the respective processes along the value chain of a lot of industries for the benefit of the company and the customer.

1. INTRODUCTION

Robotic process automation (RPA) is the use of software as "virtualized FTE" to operate applications like a person processing a transaction or completing a process in front of a computer screen. To accomplish this, robots use their own functional user IDs to log in and out of the operated applications. "Macros" are a kind of early stage in the development history of software robots.

RPA, therefore, does not replace existing applications or manipulate their code, but rather works with those systems in a manner similar to a human user. Some robots replace approximately one worker, some replace up to five workers. Nevertheless, RPA is currently not yet able to fully replace human work. Only simple, predictable tasks can be automated, while more sophisticated work is still left for human subject matter experts.

RPA is currently guided by rules rather than artificial intelligence (AI). It allows for escalation to a human supervisor in cases where the ruleset does not contain a suitable response for a specific situation. However, in the future, AI will be increasingly integrated within software robots to take over more human tasks.

RPA solutions create an audit trail for every action taken by the "virtual FTE" so that compliance to process guidelines can always be proven after the fact.

2. MARKET FOR RPA

The market for RPA solutions has developed rapidly. According to Forrester [Le Clair et al (2017)], there are more than 50 providers in the market with prices ranging between U.S.$ 5,000 and U.S.$ 10,000 per robot, depending on provider and functionality. According to a 28-criteria evaluation, Forrester classifies the following providers as leaders: Automation Anywhere, Blue Prism, and UiPath; as strong performers with competitive options: WorkFusion, Pegasystems, NICE, Kryon, EdgeVerve, and Redwood; and as contenders: Kofax, Contextor, and Softomotive.

The current focus of innovation is on robot management and governance functionality, such as central control of robots, preservation of formerly human process knowledge, and governance, such as connectivity monitoring, rollback capabilities for processing failures, and testing capabilities for application changes. AI seems to be the next focus; probably in a few years. This means that robots are no longer mere commodities. They are growing in functional maturity, which means that potential users should look at the offers in detail rather than rush to sign with the first provider they meet. The same is true for IT service companies that offer implementation and other services surrounding RPA.

3. DEVELOPMENT OF RPA SOLUTIONS

The early incarnations of today's RPA were mainly screen scraping solutions that sought to integrate new software applications with legacy applications that had no readily available means for automated interfacing.

Evolving to rule-based machines that could automate business processes across system and organizational boundaries, RPA solutions have recently started to leverage machine-learning approaches to improve process quality over time, alleviate recurring situations that require human intervention, and generate new insights from legacy application landscapes.

> "Right now, many finance jobs require people to act like robots, so they'll easily be replaced by robots."
>
> [Rosenfeld (2017)]

While previous solutions required human interaction whenever none of the predefined rules applied to the case at hand, machine learning enables future RPA solution to learn from how exceptions are handled by human operators to eventually enhance their ruleset. Machine learning is also applied to classify unstructured documents, such as Kofax Kapow and WorkFusion Intelligent Automation, in preparation for RPA processing or assist in building or improving the rule-base for an RPA deployment, such as Automation Anywhere IQ Bots.

Intelligent virtual assistants, such as IPSoft's Amelia, aim to bridge the gap between customers communicating via natural language and highly automated back-end processes. WorkFusion blends machine-based robots with crowdsourced humans to enable automation of process steps that exist at the boundary between "machine work" and "expert work"; still out of reach for a pure robotic solution but standardized enough to be distributed among machine and low-skilled human workers. Overall, the impact of further developments in machine learning, automation, and AI put a large

percentage of human employment at risk. Frey & Osborne (2013) estimate, for example, that about 47% of total U.S. employees have to be considered at a high risk of being replaced by machines in the foreseeable future (about one to two decades). As Deutsche Bank CEO, John Cryan, stated recently: “Right now, many finance jobs require people to act like robots, so they’ll easily be replaced by robots” [Rosenfeld (2017)].

This will have an impact on the financing of social security systems, which are usually connected to the direct income of the workforce. Microsoft founder, Bill Gates, and Siemens CEO, Joe Kaeser, have already proposed to tax software and robots to solve that issue.

4. RELATED AND COMPETING APPROACHES

Unlike competing technical strategic approaches, such as EAI (enterprise application integration), SOA (service-oriented architecture) with enterprise integration layer, or business process management with automation functions, the more tactical RPA does not require changes to existing applications and thus does not trigger any larger IT change projects. Typical payback periods for investments in an RPA initiative are measured in months rather than years.

Unlike competing cost cutting approaches, such as outsourcing/offshoring/nearshoring or any other labor cost arbitrage like in-house outsourcing to legal entities with a cheaper labor tariff structure, RPA keeps everything in-house and onshore. In addition, RPA also benefits from other factors, such as higher process quality.

Other well-known benefits of RPA are:

- Quick productivity gains within weeks, or a few months, i.e., almost instant cost cuts.
- Upfront investment costs and license fees are small and can be calculated reliably, as can the return on investment (RoI).
- Suitable as a tactical interim cost cutting solution if strategic technical solution is still too expensive.
- Robots can work 24 hours a day, 7 days a week.
- No, or minimal, process changes are needed, though the introduction of RPA can trigger process improvements.
- No, or minimal, application changes required.
- It is scalable and benefits from economies of scale.
- Improved quality output compared to human workers, i.e., lower failure rate and risks.
- Continuous and transparent compliance documentation.

- Potential for process improvements during implementation, because of detection of shortfalls, gaps, etc.
- Lean Six Sigma programs can benefit from introducing RPA for highly standardized tasks, since process repeatability of a "virtual FTE" produces a lot of data, which is required for six sigma, and removes humans as possible sources for errors.

The advantages are clear and simple; the potential caveats are not. Nevertheless, they need to be considered for sound management decisions on the use of RPA and on the selection of the right provider.

Typical caveats connected to RPA initiatives comprise:

- New IT architecture feature (the robots) need to be serviced rather than a strategic layer integration.
- New IT systems (the robots) require new IT security coverage.
- Reduces business case for strategic solution and, therefore, may delay the strategic solution.
- Currently still for routine work only, i.e., standard processes need to be cut out of the end-to-end process logic to be automated by RPA.
- The resulting fragmented part of the end-to-end process still needs to be serviced by human workers. Depending on the individual process management layout, this can increase process complexity for human workers. This can mean more setup times at the interfaces between RPA-process parts and human worker process parts, which could mean more failures on the human side.
- Currently for paperless work only; data needs to be digitized.
- Once automated, processes are out of sight and can, therefore, shift out of focus for process improvements.
- RPA is just this – automation. It does not trigger or replace the surge for new digital business models. RPA should not distract you from that task.
- Robots need to be supervised; the work does not just vanish. New tasks emerge with RPA.
- Legal issues may emerge if functional user IDs of robots are misused.
- Social impact of RPA implementation on workforce needs to be taken into account.

5. BUSINESS CASE ELEMENTS

One of the main arguments for RPA is instant cost reduction with small upfront investments and reliable RoI estimations. Here are some main elements of any RPA business case to show the total costs and benefits of RPA ownership.

The benefit side comprises:

- Reduced processing workforce (in euros per year): the number of reduced full-time equivalent capacities depends on (1) the automated process steps and the respective handling time (the longer the handling time, the better; and you have to offset new complexities and fixing costs for additional failures, if applicable), (2) the quality assurance process steps (and thus handling time) formerly needed to ensure the quality of the then automated steps (this also means reduced worktime costs for failure fixes), and (3) the number of transactions per process (the higher the transaction volume, the better).
- Reduced office space (in euros per year): this should have a very tight correlation to the reduced workforce and includes the rent for the office, depreciation of furniture, front-end IT installation and operation (helpdesk, etc.), canteen, etc.
- Reduced costs due to defective processing (in euros per year): clients hold you liable due to defective processing. These costs will be reduced with higher quality without human failure.
- Reduced "FTE overhang costs" or improved scalability/turnover (in euros per year): in the old model, you had to hire new people with increasing turnover volume and lay them off with decreasing turnover volume. (a) If you have a craftsman/artisan shop that is operated by deeply skilled and trained workers, you have to pay for the skill on the workforce market or you have to train them for some 1-3 years. This model does not allow you to "breathe with your costs with the market." Instead you have a time lag in adjusting workforce demand and supply (i.e., your capacity). Because market demand changes, you systematically have either too many (salary costs) or too few (that costs you in terms of turnover and thus income and/or market share) people on board. RPA can overcome those costs because robots are scalable. (b) If you don't have a craftsman/artisan shop but already have an industrialized factory model in place with lower skilled workers that can be 100%

productive within weeks, RPA does not provide you with that benefit, because you can already "breathe with the market."

- New revenue sources because of new products (near real-time; in euros per year): robots work 7x24 and are just-in-time scalable, depending on their buffer capacity. This makes it possible to have very short service level agreements, which in turn allows for new offers to clients or new client experiences. This can lower the cost of client acquisition and improve client retention and opens the doors for new income sources.

The cost side comprises:

- Limited one-off investment costs upfront for framework (in euros): costs for internal resources (e.g., to adjust policies, to make decisions) and costs for consultants (e.g., for feasibility study, etc.).
- Limited one-off investment costs upfront per use case (in euros): costs for internal resources (e.g., for technical implementation in the data center), costs for robot provider, costs for service provider, costs for consultants (e.g., for process preparation), and human resource costs (e.g., early retirement costs).
- License costs (in euros per year): typically robots are not bought but rented or licensed. You pay per time unit or per transaction. Very often, there is a minimum time period in the contract, e.g., three years, to cover the total expenses of the provider. These license costs cover upgrades to new versions, helpdesk, hot fixes, etc.
- New workforce costs to control and govern RPA (in euros per year): the cost structure depends on your framework settings. You can decide, for example, on a central control team or several decentral control teams. Front-end changes of applications need to be governed and "trained" for the robots, depending on your product.
- Costs of new workforce to control and govern RPA (in euros): the profiles needed are quite different form the automated process operation profiles and are usually more expensive. You can acquire those skills through training (training costs) or by hiring people (recruiting costs).
- Office space costs for those people (in euros per year): see office space costs on benefit side.

6. BUSINESS SCENARIOS SUITABLE FOR RPA

RPA should be considered in the following situations: need to improve/automate currently manual processes, need to increase FTE productivity while maintaining accuracy, failure to realize RoI on EAI, improve return on BPO initiatives by automating the lower-level tasks instead of just moving to lower-cost human FTE, and new online or mobile front-end desired for legacy back-end architecture.

Tasks suited for RPA include: data entry and validation, file and data manipulation, formatting, and multi-system data entry/reconciliation.

Examples of successful applications of RPA include Bloomberg's use of WorkFusion to automate data capture and crowdsource quality assurance for a base of about 500,000 existing company records that have to be maintained from SEC filing data, or the Co-operative Bank using BluePrism to automate part of their payment processing, deciding whether to process or return payments from accounts with low or insufficient funds.

Hitting a cost-saving roadblock after using traditional labor-arbitrage for their IT processes, a major financial services firm leveraged IPsoft automation to replace labor and vastly reduce manual interventions, resulting in a 35% FTE reduction in support teams during the first year. Finally, USAA used IBM Watson to automate customer services for 150,000 users in a one-stop shop for veterans in need of assistance on matters from job searches to government benefits.

7. IMPLEMENTATION PROJECT

The implementation of an RPA solution has at least three phases, the proof of concept, the pilot, and the leverage phase to other use cases within the company.

The **proof of concept phase** starts with the determination of the purpose of an RPA implementation and identification of potential use cases inside the company. Set out your objectives for an RPA program and take those objectives as initial objectives only, since you can be in danger of simply following the herd, without fully grasping the consequences. Confirm and adjust those objectives during the project. It is essential to have those objectives to measure their delivery later on.

The next step is to look for use cases. To find them, you have to look at end-to-end processes, as well as their details. Depending on your process landscape, you might find that only parts of end-the-end processes may be suitable for RPA automation. Scan your total process landscape systematically to find all and the most profitable use cases. A typical mistake is to identify the first use cases "by coincidence." To exploit your entire benefit potential of RPA usage you need a systematic approach.

Look out for RPA providers and/or RPA service providers that best support your objectives and use cases. Get familiar with the products. Select your shortlist of providers, and use the data to draft your first business cases.

It is at this stage that you are able to build on your internal RPA framework. Most probably, you have to adjust policies and/or write new ones. Further, you have to make technical decisions like introduction of a functional user ID, architectural "location" of the robots, etc.

Some important questions that need to be answered are: who will be responsible for RPA governance: business or IT? Who will control them during daily production: backoffice, data center production, or a new group wide central RPA control group? What adjustments are needed to change the management of IT access rights? Who will apply for the access rights of a new robot? Does the granularity of the access rights fit for the new robot use cases? What business lines will be involved? What access will audit and compliance get? And, what are the new performance measures?

At the end of the proof of concept phase you will have objectives, use cases, a selected provider, or at least a shortlist, and your internal framework preparation completed. In addition, a first rollout roadmap could be drawn.

The **pilot phase** focuses on the implementation of one or few RPA use cases. You start with the preparation of the procedural and technical environment.

Paper needs to be transformed into electronic data (e.g., via scan, OCR, (free-)form capturing) or flawless dataflows without data breaches need to be introduced, using, for example, client front ends that provide the data electronically instead in the form of paper. However, that is not the end of the story. Even the electronic data need to be standardized for RPA use; RPA may require the data to be cleaned. If, for example, some records provide data content in one data field and others don't, the robot may be confused and stop working or it will produce nonsense process results.

An electronic process trigger needs to be implemented to initiate an RPA transaction later on. The robots need to be technically rolled out in the data center (or somewhere else) and customized for your special need. They also need to be equipped with the functional User ID.

The end-to-end processes have to be cut according to the future allocation of work between robots and humans, and the former needs to learn the routine processes that it will perform in the future.

Finally, the robots need to be tested.

With these preparations, the pilot itself can be initiated. It needs to be monitored to deliver the information needed to optimize the RPA operation according to your objectives and to adjust the rollout roadmap.

You have now identified the essentials necessary for leveraging the RPA concept across all of your use cases and to even identify more of them in your company. This leveraging phase will hopefully deliver on your objectives to implement RPA.

To implement **RPA as a sustainable tool of your management system**, you should expand your framework by a process to systematically detect all use cases in your environment that can potentially be automated by RPA, if you have not done that already in the proof of concept phase. In fact, you have to assess all manual work in the backoffice – and yes, also in the front office. Very often, there are still a lot of administrative tasks in the front office that can be done by RPA. And here we are not talking about client facing robotics. Unproductive, but necessary administration, might be everywhere.

Typical project risks: If you don't plan the RPA introduction well, robots may be too slow, too expensive, and introduce too much complexity. Some cases show that the implemented robots could not be used at all. A neutral partner with professional knowhow can neutralize these risks. In addition, the benefits of RPA can most probably be harvested earlier; making it right from the beginning.

8. OUTLOOK

Robots and RPA are here to stay and promising to gradually become smarter over time as vendors compete to increasingly include machine learning into their solutions.

You can use this new technology to automate your old business model or you can utilize it for a new digital business model.

Robots and human workers will work side by side, with each focusing on their competitive edge. Robots are best in data processing, consequently, they will impact the respective processes along the value chain of a lot of industries for the benefit of the company and the customer. The **right use** of technology is the key to sustainable success. This could be the value add of consultants, who understand you, your business, the future of your business, and the new technology of software robotics.

References

Frey, C. B., and M. A. Osborne, 2013, "The future of employment: how susceptible are jobs to computerization?" report, Oxford Martin School, University of Oxford, http://bit.ly/2yym1vt

Greer, S., and C. Beattie, 2016, "Robo op - how robotic process automation is applied in banking operations," Celent, November 28, http://bit.ly/2wNThzb

Le Clair, C., A. Cullen, and M. King, 2017, "The Forrester WaveTM: robotic process automation, Q1 2017," Forrester, February 13, http://bit.ly/2kaojyt

Rosenfeld, E., 2017, "Deutsche Bank CEO gets brutally honest about what automation is going to do to banking jobs," CNBC.com, September 17, http://bit.ly/2xH0zXu

Rürup, B., 2017, "Abgabenbescheide für roboter," Handelsblatt, May 2, p.12, http://bit.ly/2fXHDL5

Tornbohm, C., 2016, "Market guide for robotic process automation," Gartner, November 7, http://gtnr.it/2nV6XG8

ABOUT CAPCO

Capco is a global technology and management consultancy dedicated to the financial services industry. Our professionals combine innovative thinking with unrivalled industry knowledge to offer our clients consulting expertise, complex technology and package integration, transformation delivery, and managed services, to move their organizations forward. Through our collaborative and efficient approach, we help our clients successfully innovate, increase revenue, manage risk and regulatory change, reduce costs, and enhance controls. We specialize primarily in banking, capital markets, wealth and investment management, and finance, risk & compliance. We also have an energy consulting practice. We serve our clients from offices in leading financial centers across the Americas, Europe, and Asia Pacific.

To learn more, visit our web site at **www.capco.com, or follow us on Twitter, Facebook, YouTube, LinkedIn and Xing.**

WORLDWIDE OFFICES

Bangalore
Bratislava
Brussels
Chicago
Dallas
Dusseldorf
Edinburgh
Frankfurt
Geneva
Hong Kong
Houston
Kuala Lumpur
London
New York
Orlando
Paris
Pune
São Paulo
Singapore
Stockholm
Toronto
Vienna
Warsaw
Washington, DC
Zurich

CAPCO.COM

CAPCO