

LIGHTWEIGHT IT AND THE IT FUNCTION: EXPERIENCES FROM ROBOTIC PROCESS AUTOMATION IN A NORWEGIAN BANK

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Abstract

Lightweight IT - smartphones, tablets, sensors and Internet of things, and software robots - is penetrating organizations at an accelerating rate. This trend is challenging the role of the IT function, as lightweight IT often is being acquired and implemented by local business units. Consequently, how to organize and integrate lightweight initiatives with the IT function is a topical issue. The recommendations from research are ambiguous.

In this paper, we report from a study of a Norwegian bank implementing Robotic Process Automation. In particular, we are investigating the relationship between Robotic Process Automation and the IT function. We make use of lightweight IT theory as our analytical lens, contributing to research by unveiling the considerations and consequences of the integration challenges. Moreover, we also provide practical advice on how to implement Robotic Process Automation.

Keywords: Lightweight IT; RPA, Robotic Process Automation; The IT function; Integration

1 INTRODUCTION

In this study, we explore the organizational and technical considerations firms are facing when they are implementing lightweight IT. Companies are digitalizing at an accelerating rate, and they are increasingly making use of modern lightweight IT, e.g. smartphones, tablets, virtual robots, artificial intelligence, sensors and Internet of things, social media and analytics in order to realize their business objectives. This technology is termed 'lightweight' of two main reasons: the technology is cheap and easily available, and the development process is characterized by experimentation and innovation (Bygstad, 2015).

The role of the IS function in this new digital landscape is being challenged and questioned, and research discusses how lightweight initiatives should be organized. Bygstad (2015) argues that firms should keep lightweight IT and heavyweight IT (the core systems maintained by the IT function) separated; they should be *loosely coupled*, both in terms of technology, standardization and organization. He claims that lightweight and heavyweight IT are not only different technologies, but also different knowledge regimes. Consequently, the innovative potential of digitalization is best served by having different organizations responsible for heavyweight and lightweight IT. Bygstad makes use of four case studies within e-health to build up his argument.

Willcocks et al. (2015) studied a lightweight initiative, a Robotic Process Automation (RPA) implementation in a major telecom company. They conclude that “it was only once the IT department became significantly involved, and satisfied, that RPA use escalated, and an enterprise RPA capability began to be built, supported by both business unit and IT resources” (Willcocks, et al., 2015, p.22). Willcocks et al. consider the involvement of heavyweight IT as an important factor for lightweight IT success. Making use of Bygstad’s terminology, Willcocks et al. argue for *tight coupling*, both organizationally and technically.

In this paper, we investigate the implementation of RPA in a major Norwegian bank, with an emphasis on the relationship between the RPA initiative and the IT function in terms of organizational and technical integration. Our research question is:

What forms of organizational and technical integration are suitable at serving the innovative potential of the RPA technology?

The paper continues by explaining the RPA technology and our methodological approach. Further, our findings are presented, followed by a discussion and lessons learned, whereas the conclusion finalizes the paper.

2 LITERATURE

2.1 RPA – Robotic Process Automation

When the first industrial robot was installed at General Motors’ die-casting factory in New Jersey in 1959, the manufacturing industry found itself at the starting point of a revolutionizing journey towards automation (Robotic Industries Association, 2017). Since then, robots have developed into a near necessity in order for manufacturers to remain competitive. As technology has become more advanced, another type of robots has been introduced in more recent time – virtual robots. These robots have particularly been implemented in the service industry. Here, they assist humans by performing structured and rule-based processes, work that is typically considered to be of routine nature (Davenport & Kirby, 2016), such as evaluating loan applications in financial institutions. When virtual robots perform a task previously performed by humans, through software that mimics the steps in a structured process, it is called robotic process automation (RPA) (Robotic Industries Association, 2017). RPA is about using software to automate business processes (Lacity & Willcocks, 2015b). This software is often referred to as virtual robots, whereas one robot is equivalent to one software license (Bloem et al., 2014).

According to Lacity and Willcocks (2015b), RPA has three distinctive features compared to other automation tools: (I) RPA is easily configured and implementing it does not entail that developers need programming abilities, (II) the RPA software is non-invasive, which refers to RPA software sitting on top of existing systems, accessing systems in the same way humans would, and (III) RPA is enterprise-safe, indicating that IT requirements such as security, scalability, and auditability are easily met. Thus, software robots can improve humans’ abilities to perform cognitively demanding and unstructured tasks, and accordingly facilitate sizable economic gains.

RPA can easily be scaled up or down based on demand, in addition to making processes far more efficient, and with a significantly lower failure rate (Tronstad, Becke, & Aasgaard, 2016). As a consequence, cognitive capacity is freed and humans can spend their time performing more cognitively demanding tasks (Lacity & Willcocks, 2015a). Well-implemented RPA can also lead to high-performing teams, where humans and robots complement each other. Moreover, RPA may also allow workers to take on tasks that are more sophisticated, more fulfilling and better suited to our strengths (Davenport & Kirby, 2015). This may explain why many companies are intrigued by RPA and the possibilities deriving from the technology.

Different software tools are available, where the case organization uses a system named Blue Prism. There are four different environments in Blue Prism: development, test, staging, and production. In these environments, the user operates, configures, tests, and manages the different processes. Figure 1 is a

screenshot exemplifying the main page of a process, and is included to provide an illustration of the software.

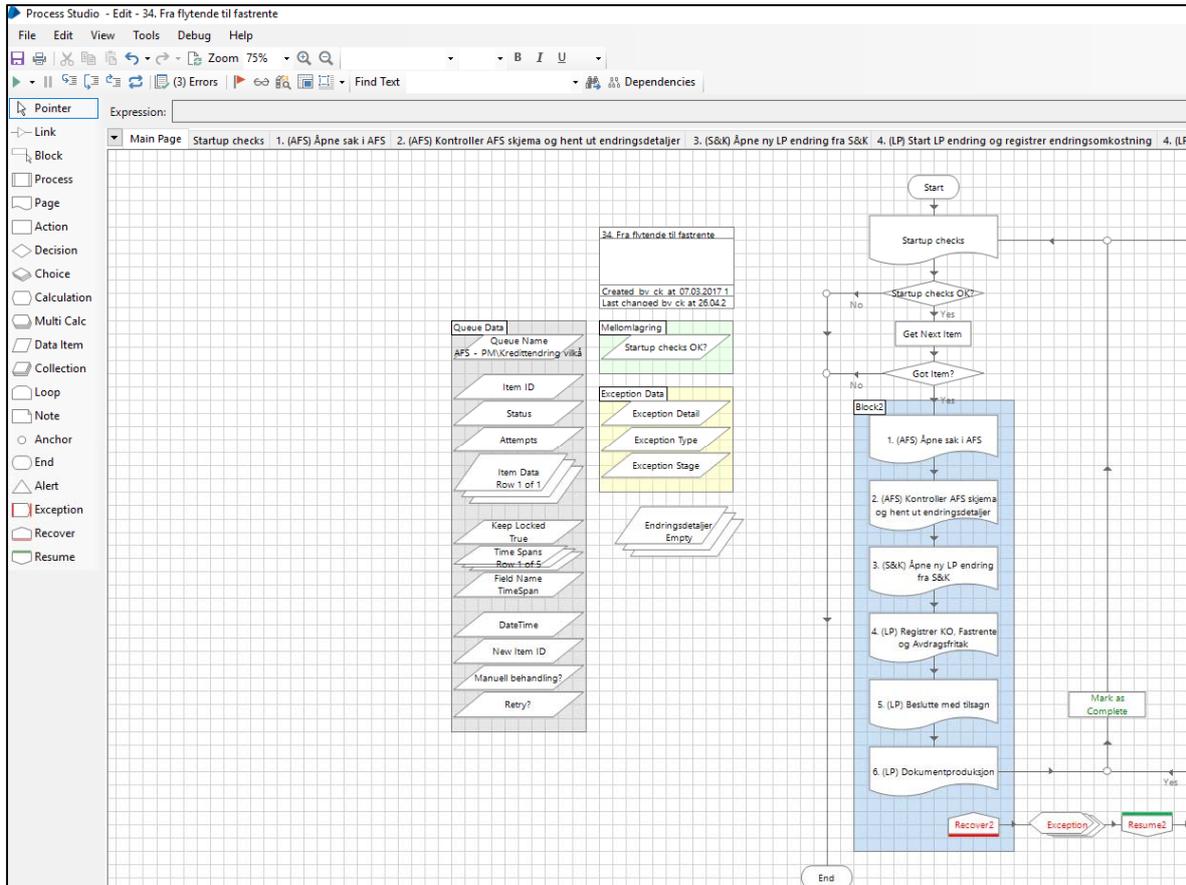


Figure 1. A business process's main page in Blue Prism

On *process* level, the business process is divided into different steps, described in the blue rectangle in Figure 1 above. Each box in this rectangle refers to another page, where more detailed information about each step appears. This is called the *functional* level, where each function represents a module. Different modules can be created so that multi-skilling the robot is possible. By clicking one of the boxes in the functional level, the process is displayed on an *object* level. In that sense, parallels can be drawn between Legos and robot configuration; a single piece of Lego represents a specific task, such as pressing one special button, and by piecing Legos together in a deliberate manner, they constitute a process. Although simplified, this is essentially how the configurator (the RPA developer) instructs the virtual robots in what to do. In a function called the Control Room (CR), the user can monitor processes in production; queues are controlled, and it can be determined whether a robot has succeeded or failed at its tasks.

2.2 RPA and the IT function

Digitalization is one of the main challenges companies face today (Singh & Hess, 2017), and companies respond to digitalization differently. Some firms are developing a digital business strategy, taking a top down approach (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013), while others are applying a *laissez faire* approach, allowing separate, uncoordinated digital initiatives to be developed ad hoc in local business functions (Bygstad, 2015, 2017; Sia, Soh, & Weill, 2016).

As described above, RPA falls under a knowledge regime called *lightweight IT* (Bygstad, 2015), in contrast to the traditional *heavyweight IT* of the IT department. The differences are illustrated in Table 1.

| | Heavyweight IT | Lightweight IT |
|---------------------|---|--|
| Profile | Back-end: Supporting documentation of work | Front-end: Supporting work processes |
| Systems | Transaction systems | Process support, apps, BI |
| Technology | Servers, databases, enterprise bus technology | Tablets, electronic whiteboards, mobile phones |
| IT architecture | Centralized or distributed | Meshworks |
| Owner | IT department | Users and vendors |
| Development culture | Systematics, quality, security | Innovation, experimentation |
| Problems | Increasing complexity, rising costs | Isolated gadgets, security |
| Discourse | Software engineering | Business innovation |

Table 1. *Heavyweight and lightweight IT*

Lightweight IT may be seen as complementary to heavyweight; it is well suited for the tasks that heavyweight IT often fails to support, i.e. the simple and immediate needs of a user. Lightweight IT typically supports work processes with simple applications or cheap technology (Alemdar & Ersoy, 2010).

The role of the IT function in digitalization is being challenged and questioned. Their original responsibility is to manage the infrastructure and the operation (Singh & Hess, 2017). For years, however, firms have expected their IT functions to extend their roles from pure technology administrator to business developer (Singh & Hess, 2017). Consequently, IT functions are today evaluated increasingly on responsiveness, fit with business needs, and time to market (Willcocks, et al., 2015). In contrast, most IT managers are faced with a situation where their IT resources are occupied with maintaining the existing enterprise systems, leaving little time and resources for digitalization and new business development. The situation is leading many firms to organize lightweight initiatives outside the IT function, but research is not conclusive whether this approach is constructive.

Bygstad (2015) has studied the introduction of lightweight IT. In order to release its potential for business renewing and innovation, he argues that the development of lightweight IT should be kept separate from the IT function, the heavyweight regime. More specifically, he suggests that the relationship between lightweight and heavyweight IT should be based on loose coupling. He presents three design principles for their relationship:

1. They should be loosely coupled in terms of *organization*. Bygstad argues that the heavyweight culture is not suited for lightweight IT, an area characterized by rapid experimentation and innovation, and with high tolerance for failures. Moreover, few IT departments neither have the resources nor the time available to engage themselves in lightweight activities. Innovation is therefore best served by developing lightweight solutions outside the IT department. Alternatively, lightweight IT initiatives could be led by a separate unit in the IT department, in line with Gartner's notion of bimodal IT (Gartner, 2014; Horlach, Drews, & Schirmer, 2016). In any case, heavyweight and lightweight solutions should be managed by separate and independent units.
2. They should be loosely coupled *technically*. Bygstad argues that integration between heavyweight and lightweight IT is complex and expensive. The reasons are that (i) the technologies are very different, (ii), the work processes are incompatible, and (iii) the discourses are often incompatible. Therefore, Bygstad argues, lightweight solutions should be successfully implemented before they are integrated with heavyweight IT. If one starts lightweight development by trying to integrate with heavyweight up front, the innovation process will be hampered and even halted. Consequently, lightweight IT should be developed initially as standalone solutions.

3. They should be loosely coupled in terms of *standards*. Bygstad argues that it is tempting to assume that standardization will ease the interaction between heavyweight and lightweight IT. However, in many cases, he says, standards are a hindrance for lightweight solutions. The problem with standards is that their development is a slow process, which again will slow down the innovation process and discourage the lightweight developers.

3 METHOD

To investigate our research question, *what forms of organizational and technical integration are suitable at serving the innovative potential of the RPA technology?*, we selected an in-depth study in a bank, using an inductive research approach (Saunders, Lewis, & Thornhill, 2012). We chose this case for two reasons. First, digitalization has gained a strong foothold in the banking industry where the potential for automation is large and the use of RPA is widespread. Second, the bank was an early adopter of RPA, giving the company knowledge of issues occurring during initiation and implementation phases, in addition to having experienced the consequential effects.¹

We performed personal interviews with seven employees in the said bank, who at different levels have worked directly with, or been affected by, the RPA initiative. We also interviewed a person from an external consultancy, who had been assisting the bank with RPA. We chose a semi-structured interview format; we used an interview guide as basis, and asked supplementary questions when necessary. The interviews were recorded and transcribed. Short summaries were sent to the interviewees for approval in order to ensure correct interpretation and to correct potential misunderstandings.

The data analysis was conducted in three steps (Miles & Huberman, 1994). First, a timeline and a case description were constructed. Then, with Bygstad's integration framework as a foundation (Bygstad, 2015), we conducted a comprehensive analysis of the case, particularly investigating organizational and technical issues related to the relationship between the RPA team and the IT function. Finally, we assessed the consequences and feasibility of the case approach.

4 THE CASE

The RPA initiative arose in 2015, with the first implementations in 2016. The initiative was mainly driven by the desire to renew the bank's business processes and the failure of the bank's central IT function and systems to meet this need. The RPA approach was chosen because investments required for this technology were small and the prospect of producing results quickly appeared prominent. Figure 2 presents the timeline for the initiative, divided into three sections; organizational issues, project management issues and project level encounters.

¹ We have agreed upon confidentiality, and will therefore not further elaborate on company details.

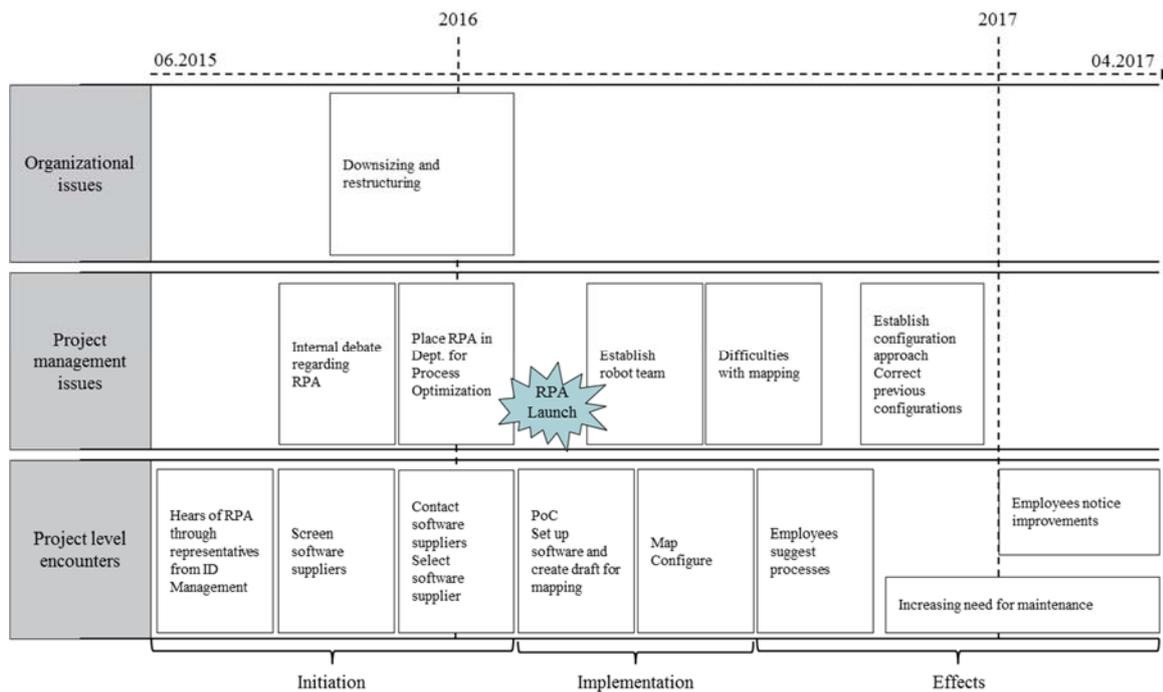


Figure 2 The RPA implementation's timeline

The main objectives for the RPA initiative were:

- Free up cognitive capacity and time by automating simple, often high-volume, rule-based tasks.
- Ensure streamlined and standardized business processes, create digital data, and reduce error rate.
- Gain benefits from scalability.
- Allow rapid development and implementation of business processes and new products

The RPA team

In this study, the RPA-team appeared to have a prominent and significant role when implementing RPA. The RPA-team was established soon after the RPA initiative was launched, and was a natural next step towards the implementation of RPA. The department for Process Optimization assembled the team, consisting of both external consultants and internal resources. The external resources were key during the initiation and early implementation, but the aim was to, in near future, solely deploy internal resources. The external consultants' tasks were to configure robots, RPA maintenance, and to train internal resources in configuration and maintenance. The internal resources consisted of a project manager, several process designers and identifiers, robot configurators, and an IT manager in charge of establishing boundaries and guidelines between RPA and IT.

The business processes

Many processes were candidates for automation. In order to evaluate the processes and decide which were more suitable for automation, a dedicated team that included the RPA team's project manager was given the authorization to prioritize the processes according to specific criteria. At the time of the study, the robots had performed approximately 100,000 tasks through performing various business processes that previously involved some level of human processing. An example is the automation of the interaction between Brønnøysundregisteret, a Norwegian government institution for information management, and the bank with regards to the establishment of corporate accounts. Another example, where the robots made it possible to offer a new product by being able to handle the increased workload; the bank quickly launched the option to establish a BSU account (a savings account for young home buyers) in the mobile bank, where robots performed the entire process.

5 FINDINGS

In the following, we account for our findings based on Bygstad's integration framework (Bygstad, 2015).

5.1 Integration in terms of organization

Initially, in the internal discussions regarding the use of RPA in the bank, the reactions from environments and stakeholders within the bank were mixed. The response from the IT function was however characterized by negativity to a greater extent than in other environments within the bank. As one of the process designers in the RPA team expressed it:

“The aversion in the IT function against robots is deeply rooted - they are of the opinion that robots are a poor man's integration tool. Robots are only a temporary IT solution, they say. They would not even name it an IT solution. Being up to them, they would prohibit robots.”

From the IT function's perspective, RPA is programming. They therefore considered it as more efficient to have all the programmers gathered in the IT function, instead of out in the organization. The conflict also revolved around professional standards. The IT function was concerned about RPA developers not having a proper IS education (but business school), and that RPA developers did not apply the methods and the best practices educated developers use. The IT professionals also had the opinion that the tasks of the RPA team should be solved with system integration and more advanced programming, perceiving RPA team members as amateurs. This illustrates a reason why tension built between the established IT function and the relatively new RPA-team. An RPA team member with a role that intersects between IT and RPA described the attitudes amongst IT colleagues towards his work in the RPA-team:

“They perceive me as a fool, and that I did not realize how stupid I was”

Early in the initiation period, many discussions, disagreements, and lobbying regarding how to organize the RPA effort occurred. The main question was whether RPA is considered an ordinary programming job for the IT function or as an innovative tool for business units working on process design. Eventually, in late 2015, the bank decided to establish a RPA team in the department responsible for process optimization, outside the realm of the IT function. There were mainly two reasons for this decision.

For years, process optimizing had been the responsibility of the IT function. Consequently, process improvement and IS development had been closely related. To renew the process improvement initiative, the responsibility had recently been transferred to a new business unit, the department for Process Optimization. As one of the drivers towards initiating RPA was the desire to renew the bank's business processes, the bank saw the opportunity to increase the speed on process improvement by placing RPA outside of IT. The RPA team would then be able to redesign the bank's processes, without having to bring each idea through the IT function's lengthy priority loop.

Another argument for organizing the RPA team outside IT was brought up from Gartner, an international consultancy company. Gartner, a longstanding counselor to the bank, advised them to set up the RPA team in a business unit, outside IT. According to Gartner, the business side often loses interest in RPA if led by the central IT function. Innovation, both in speed and scale, will be hampered, they said.

As we will see in the next section, although the RPA team was set up as an autonomous and separate group in the business, they were dependent on the IT function on some technical issues. In organizational terms, the following four players were involved in developing and maintaining the RPA solutions (Figure 3): (i) the RPA team, located in the department for process optimizing; (ii) the various local business units that owns the business processes; (iii) the system group in the IT function and (iv) the operation group in the IT function.

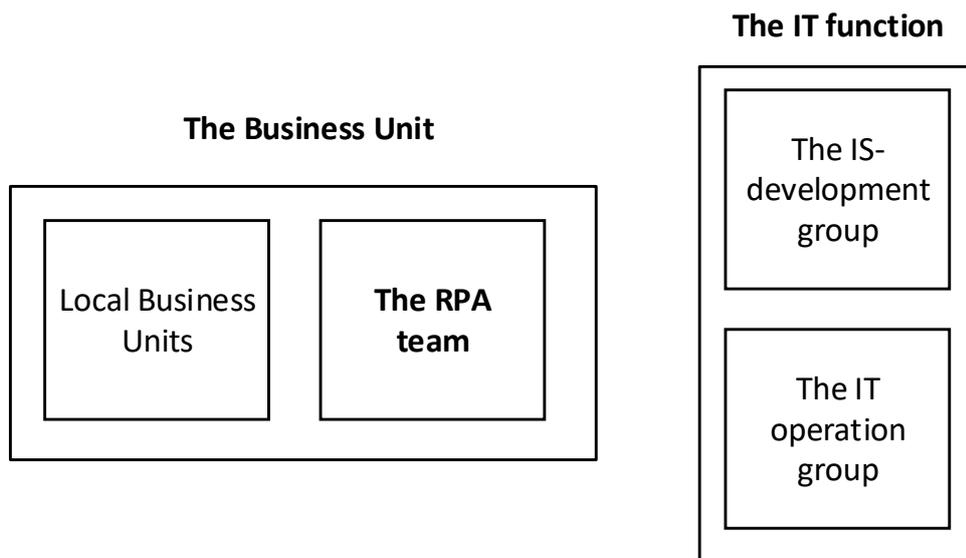


Figure 3 The four players involved in developing and maintaining the robots

5.2 Integration in terms of technology

The level of integration between the robots (lightweight IT) and the core bank systems (heavyweight IT) was low: the robots were only integrated on a keyboard level (at the presentation level).

However, the RPA team soon realized that they, on several issues, were dependent of the central IT function, as this department is responsible for configuring clients and servers and managing the authorization privileges. In sum, the IT function assisted the RPA team with the following tasks:

- Setting up (configuring) the computers that the RPA team was using, ensuring that the computers have the necessary software (the IT operation group)
- Giving the robots authorization and access to the core bank systems (the IT system group)

Apart from this, the IT function's mandate was to be 'helping at a distance'. The IT manager involved with the RPA-initiative commented:

"Initially, we said that they [the RPA team] can do their own things, and we will help them with access to the systems and with machines and hardware and so on. Therefore, our role has been to try to help them in succeeding and then staying away."

Gradually, the IT function involved themselves more in the implementation. The IT manager commented:

"(...) Now, we are really helping them with providing counselling, defining standards, making solutions and so on."

The increasing involvement of the IT function created a tension between them and the RPA team. The IT manager continues:

"Sometimes we have been thinking, 'this should not be done'. Therefore, a couple of times we have put our foot down and said 'this cannot be done this way'. And this has created conflicts"

Two more technological issues must be mentioned. First, in a few situations, the RPA team was allowed to use APIs for accessing the core bank systems. The main reasons was to avoid making too complex and cumbersome RPA solutions based on 'clicking' through a high number of different application interfaces. In general, however, the team built RPA solutions that imitate the procedure a person would have chosen in carrying out a task manually, without applying any APIs.

Second, for the RPA team to test their solutions before putting them in production, the IT function provided the RPA team access to the bank's test environment.

5.3 Integration in terms of standards

There was no need for developing technical standards for the RPA implementation. However, the bank found it necessary to establish two guiding policies for the use of RPA. It was the IT manager, together with the bank's IT architect, who led the development of these.

First, there was a discussion whether the robot should be defined as an 'employee' or as an IT-system. This was important, because the outcome of this decision had consequences for how the RPA solutions should be designed and built. The bank decided on the first approach, as 'employee'. This approach implies that the developers were to make RPA solutions that follow the same workflow, using the same applications, and doing the same 'clicking' as bank employees do. The RPA developers should not apply system design principles based on system integration, and mechanisms for downloading and uploading of data.

Second, the bank decided on guiding principles for when to use a robot and when not to use a robot. By this, they avoided endless discussions about which tasks that were suited for RPA.

5.4 Monitoring and Maintenance

The maintenance of the robots emerged as an important task. Gradually, the RPA team experienced that the virtual robots required a lot more maintenance than initially expected. The RPA project manager commented:

"You always underestimate the complexity of things, even if it is simple. There is more need for monitoring and maintenance than we thought one year ago.We just wanted to get started, and our focus was on delivering solutions."

One of the main causes for RPA maintenance was the recurrent system changes in heavyweight systems. After a system change, for example an update of the user interface, the robots usually had to be re-configured. The main problem, as seen from the RPA team, was that they were not informed about program changes in advance. This created the need for the RPA team to constantly monitor the robots. The IT function's change management process was obviously a problem; as the RPA team was not included in this process, they were not informed about planned changes on a daily basis. The system changes also created problems for the business. When a robot 'abended', as a consequence of a system change, the RPA team had to alert the affected business unit that the robot is 'down', and tell them that they need to step in and to do the tasks manually.

The need for maintenance is obviously a concern for the RPA project manager, who sees the need for a more structured approach:

"I think that now we are in the phase where we need to formalize things a little more. We need to monitor and maintain these processes properly"

According to the project manager, the right approach would be to formalize and reinforce the RPA project into a permanent 'RPA center of excellence'.

The IT manager, who also witnessed the maintenance challenge, had a different opinion:

"Let the IT function integrate the solutions with best practice standards, and maintain the RPA solutions in a better way"

At the time of the study, no decision has been taken on these matters.

6 DISCUSSION AND LESSONS LEARNED

The research question for this study is *what forms of organizational and technical integration are suitable at serving the innovative potential of the RPA technology?*

6.1 Loose organizational integration

As discussed in Gartner's concept of *bimodal IT* (Gartner, 2014) digital business innovation may be best served by dividing the IT function in two different units; one for traditional IT and one for disruptive initiatives. This is also supported by Bygstad's (2015) principle of loose coupling between heavyweight and lightweight IT.

In our bank case, establishing the RPA team in the business unit was a success. They experienced that people working with the virtual robots did not need a technical background. The software was inexpensive, and the technology turned out to be quite stable. The RPA developers, including those redesigning the processes, were able to deliver business results relatively quickly, without, as they said, being hampered by the IT function's workload and priorities. Placing the RPA technology in the hands of those responsible for process optimizing turned out to be a success. The bank was able to optimize its processes and offer new services due to the possibilities arising from robotic automation, without being dependent on heavyweight IT. The respondents were conclusive; the team working with RPA must sit in the business, and RPA capability must be built there. However, the respondents also highlight the importance of establishing a good relationship with the IT function.

To conclude, our findings on organizational integration support Bygstad's recommendation of loose organizational coupling (2015). However, in *operations*, this principle may not apply; the continuous need for cooperation when the central IT solutions are changed and maintained, were well illustrated in our banking case.

6.2 Loose integration of technology and standards

Integration is often perceived as the holy grail of IT development because it allows for the interoperability of systems, and avoids unwanted redundancy and inconsistency of information (Silsand, 2017). However, as systems have become larger and more interconnected, integration is also expensive, and increases dependencies and the overall complexity.

In our case, the bank decided, and managed to build, the lightweight solutions without integrating them with the banks heavyweight systems. Consequently, there was no need to develop technical standards to support integration. The RPA team was, however, dependent on the IT function's technical expertise when it came to setting up the computers and authorizing access to the banks heavyweight systems. In sum, these findings support Bygstad's (2015) recommendation of loose coupling of technology and standards.

Two issues might challenge this conclusion; first, the ongoing and increasing need for maintaining the robots. Looking forward, several respondents stated that maintenance would take up sizeable amount of resources, leading to a concern regarding placement of RPA responsibility, and whether to integrate RPA solutions into the current IT-infrastructure. Second, as the RPA solutions are developed further, user requirements will inevitably ask for more information from the core systems, and gradually increase the need for integration.

7 CONCLUSION

Digitalization challenges the traditional role of the central IT function. In this study of Robotic Process Automation in a large bank, we investigated the relationship between the RPA development team and the IT function. We find that the principles of loose coupling between traditional heavyweight and lightweight IT is beneficial for innovation, but that there are important challenges regarding operation stability, maintenance and further development of RPA solutions to consider.

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