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Robotic Process Automation:

Mature Capabilities in the Energy Sector

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Research on Business Services Automation

Research Objective:

The academic researchers at the Outsourcing Unit (OU) aim to assess the current and long-term effects of business services automation on client organizations. While using software to automate work is not a new idea, recent interest in service automation has certainly escalated with the introduction of new technologies including Robotic Process Automation (RPA) and Cognitive Intelligence (CI) tools. Many potential adopters of the new types of service automation tools remain skeptical about the claims surrounding its promised business value. Potential adopters need exposure to actual and realistic client adoption stories. Academic researchers can help educate potential adopters by objectively researching actual RPA and CI implementations in client firms, by assessing what the software can and cannot yet do, and by extracting lessons on realizing its value.

About The LSE Outsourcing Unit:

The Outsourcing Unit (OU) is part of the London School of Economics and Political Science (LSE), acknowledged as the world's premier social science university, and ranked first, even above Cambridge and Oxford Universities, in a 2014 Research Assessment Exercise in business and management studies. The OU draws upon a 2,300 plus case study database covering all major economic sectors and countries, and provides independent, objective and rigorous, timely research, report and advisory services to business, government, and third sector organizations. Previous research, published working papers, articles, media news and books can be reviewed on www.lse.ac.uk/management/research/outsourcingunit.

Robotic Process Automation:

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Although the term "Robotic Process Automation" (RPA) connotes visions of physical robots wandering around offices performing human tasks, RPA most commonly refers to configuring software to do the work previously done by people, such as transferring data from multiple input sources like email and spreadsheets to systems of record like Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) systems. The "robot" is assigned a logon ID and password and executes tasks just like a human would. As one process automation manager we interviewed explained *"The automation doesn't change anything in the core systems, it just uses what we already have."* For example, the "robot" could be instructed to logon an e-commerce system and extract a social security number from a loan application, logoff, logon to a consumer credit reporting system, enter the social security number to retrieve a credit score, logoff, logon to a loan approval system, enter the credit score, retrieve the interest rate, apply rules to preapprove the loan, then send the customer an approval notice, etcetera.

Because of its ease of use, there is an RPA revolution happening inside the business operations groups of many companies like Ascension Health, Telefonica O2, The Associated Press, VHA, and Xchanging and across sectors like financial services, health care, telecommunications and energy. Early adopters of RPA are finding that automation can radically transform back offices, delivering much lower costs while improving service quality, increasing compliance (because everything the software does is logged), and decreasing delivery times. Another benefit is liberating employees from tedious tasks to focus on more varied, challenging, and valuable work. But as with all innovations, organizations must learn to manage RPA adoption to achieve maximum results. Potential RPA adopters need exposure to realistic client adoption stories.

In this case study, we describe a major European utility's successful implementation of RPA and share the lessons it learned to attain results. At the request of the company, we use UTILITY as its anonymised name. After first experimenting with automation in 2005, UTILITY scaled RPA massively and has since built mature RPA capabilities. The RPA account manager for UTILITY promises that would-be RPA adopters will learn many insights from studying the implementation: *"UTILITY has one of the most mature, well-structured, well-oiled, and well-regarded RPA capability among any automation customer. Yes, it has a very impressive scale with 300 robots but the maturity of their demand management, delivery management and robotic operating model renders their RPA capability truly stunning."*

To further convince potential RPA adopters of the business value achievable with RPA, we begin this case study with the end results. As of May 2015, UTILITY deployed over 300 "robots" to automate about 20 to 25 percent of its back office work associated with meter management, customer billing, account management, consumption management, segmentation and exception

processing. The robots process about 1 million transactions each month yielding an average return on investment of 200 percent within 12 months (see Table 1).

Table 1: UTILITY's 2015 RPA Capabilities at a Glance					
Percentage of processes automated	**Number of Automated Processes**	**Number of RPA transactions per month**	**Robotic Scale**	**Payback Period on Typical RPA Project**	**1-Year ROI on Typical RPA Project**
about 25%	about 25	1 million	2 humans orchestrate 300 robots that perform the work of 600 people	12 months	200%

The Energy Sector: Business Context for RPA

To put the RPA journey into context, we here explain something of UTILITY's business background. It is is one of the big European energy suppliers of electricity, gas, and related services to homes and businesses. It also operates and manages a portfolio of coal, gas and oil-fired power stations. In 2015, UTILITY employed thousands of people and served millions of customers.

As typical in the energy sector, UTILITY had gone through a number of acquisitions, restructurings and shifts in corporate strategy. Under its structure electricity was generated under a centralized European headquarters, with separate business units operating as retail businesses. Corporate challenges included reducing costs and increasing revenues in a political environment that was increasingly subsidizing renewable energies. Both profit margins and utilization of traditional power generation were in decline across Europe. UTILITY needed to target dramatic savings but was also looking to expand into renewable energies and to modernize its infrastructure.

In one country, the retail business aimed to become number one in customer experience by 2016. This required a number of transformation programs, process redesigns, and large scale changes in the way the employees worked, and the technologies applied.

UTILITY needed to reduce business operations costs in order to contain consumer prices. Cost reduction became another major strategic thrust. Outsourcing, transformation programs, and information technologies were all deployed to meet this goal. In 2014, more work was moved offshore to India-based service providers and more work was outsourced to domestic service providers. As of 2014, about 50 percent of UTILITY's customer service processes were outsourced.

It is within this context of a business strategy to improve customer service and to reduce costs that the enterprise RPA ramp-up took place. Initially, RPA began in the mid-2000s in one division, fizzled out a bit, then RPA was adopted by another division a few years later where its true business value became evident. By 2013, under the new business strategy, RPA was ready to scale up to 300 robots to contribute to these goals; the RPA strategy became aligned with its business strategy. RPA had been enormously valuable in delivering process efficiencies that could be passed on to customers. RPA also allowed employees to focus on value-adding front-office activities, including working directly with customers. In the next phase, RPA would be deployed to an even larger digital workforce, with RPA becoming a fundamental pillar in the future business strategy.

The RPA Journey

The first few UTILITY people to experiment with RPA in the mid-2000s were from one of the smallest business divisions. The adoption happened so long ago that few remaining employees can remember it. UTILITY automated one process that used a handful of robots and no more for the first couple of years.

Most people mark 2008 as UTILITY's first serious adoption of RPA. This adoption occurred within the residential business with its millions of customers. At that time, UTILITY had many bespoke systems and many parts of the legacy processes were still manual. According to one senior executive, the 2008 objective was to find out how to use the technology. The 2008 business case was to license 10 robots from an RPA provider, in order to automate a few specific processes that were costing quite a lot of money. A small team picked off very simple processes and proved that the technology worked.

The small RPA team began finding processes to automate, and it learned from early missteps. Initially, UTILITY had some unrealistic expectations about automation and subsequently picked some processes that were not ideally suited for automation. On one pilot process, UTILITY tried to replicate a Management Information (MI) function but soon realized that there are better tools to do MI. Through trial and error, UTILITY learned to better identify processes or sub-processes for automation. Sometimes it was worth automating just a portion of a process. UTILITY learned that the sub-processes (hereafter we use "processes" for readability) ideally suited for automation have unambiguous rules, require limited exception handling, have high and predictable volumes, and operate in a stable environment (see Lessons Learned for more detail). The sub-processes to find, sort, and resolve many, what were called infeasible customer meter readings were examples that fit these criteria well. One senior manager at UTILITY reported that RPA gives UTILITY the opportunity to look at repetitive human tasks that are actually quite "mind-numbingly boring".

Successful RPA example: resolving infeasible customer meter readings

Millions of UTILITY residential customers need to have their meters read four times a year for billing. A customer's meter reading could be self-reported or done by a hired meter reader, but either way, thousands arrive each day. Before RPA, the legacy mainframe system electronically applied rules to determine whether a meter reading was feasible or not. There could be many reasons to doubt the meter readings. For example, if this quarter's meter reading was lower than the previous quarter's meter reading, it would indicate the infeasible situation that the customer was adding electricity to the grid rather than consuming it. Infeasible meter readings were kicked out of the mainframe legacy system and given to between 25 and 30 people to manually resolve them. Depending on the situation, humans applied rules or judgment to fix errors. Infeasible meter reading resolutions that were highly rules-based were suitable for automation (see Figure 1). Humans would continue to process the exceptions that required judgment. The business case called for reducing the FTE count by about 60 percent, improving the quality, consistency, and speed of resolutions.

This application was highly successful (see Figure 2), but it was targeted to be decommissioned after an enterprise resource planning (ERP) implementation. The ERP system was expected to manage business operations and customer relations and to replace much of the legacy system functionality. Initially, UTILITY had some naïve expectations that the new ERP system would replace the need for all the robots. It soon discovered that ERP systems required manual completion of many processes that were still ideally suited for automation. RPA was reinstituted to help with meter reading feasibility again, but this time it was called "plausibility" to match the enterprise systems' terminology. RPA, in turns out, complemented the ERP implementation.
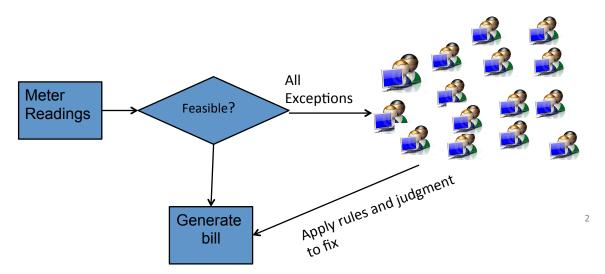

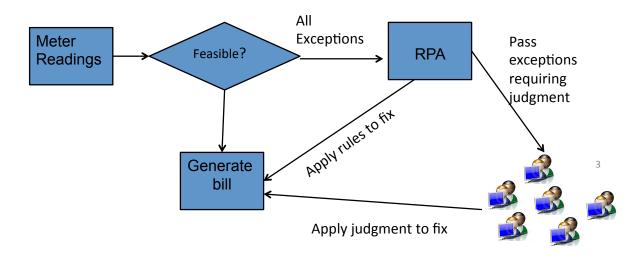**Figure 1: Meter Reading Process before RPA**

Figure 2: Meter Reading Process after RPA

The IT department tolerates RPA

Initially, the RPA pilots were so small that they were under IT's radar. But as RPA began to scale, IT began to notice large volumes of activity running on some systems. IT managers were concerned about the increased risks to corporate systems since RPA was being conducted by business operations. Without IT's control, how could IT assure system availability, response time, security, and compliance? Suppose RPA caused something catastrophic to happen to the company's corporate systems? Anticipating a barrage of questions from the business to the IT help desk, IT questioned whether it should be running RPA as a major IT program instead of RPA being run by business operations.

The RPA team and the RPA provider demonstrated to the IT department that the software met its requirements for security, scalability, auditability, and change management. They convinced IT that RPA should be housed in business operations because RPA was only doing processes the way a human did—no programming code was being touched. After the initial concerns were assuaged, the relationship with IT improved, with one senior operations manager confirming that they now (2015) have a good working relationship with IT.

RPA adoption spreads

In 2010, RPA adoption accelerated. Word spread among business operations groups about the business value of RPA. More and more business operations groups wanted to automate their processes. People were added to the RPA team to meet increased demands for more automation. The team grew from three people to seven people. The RPA provider account manager recalled that *"It got to a point where demand was almost outstripping delivery supply in*

terms of their RPA capability to build it." Business operations groups were increasingly asking the RPA team to examine their process documentation for automation suitability.

RPA spread to the industry supply side of UTILITY's business as revenue management, meter management, and boiler insurance processes were automated. In the sustainable practice part of UTILITY, RPA was applied to solar energy. By mid-2015, 25 percent of their back office transactions were being performed by robots.

Selling the IT department on RPA's Enterprise Worthiness

UTILITY's business operations group had grown the IT infrastructure organically as it scaled to 85 robots by 2012. During the growth, whenever the RPA team wanted to add ten new robots, they had to scramble to get another server. They ended up with a heterogeneous set of servers located in different countries. However, when the RPA team was looking to massively scale RPA to 300 robots, it wanted IT's support in turning RPA into an enterprise-wide system. The RPA team wanted a larger, more homogenous and robust infrastructure. The RPA provider staff and the RPA team had several meetings with IT leadership and IT middle management to discuss the future expansion of RPA.

RPA scales to 300 robots

At the start of 2013, UTILITY implemented their plan to more aggressively and strategically pursue automation. Rather than buy robots for particular processes, the company decided to buy a robot army that could be deployed anywhere across its businesses. By 2014, UTILITY licensed 300 robots for multiple years. Robotic automation had become part of the strategy to use technology to increase customer satisfaction and help position the organization as a leading energy provider in Europe. RPA would increase in the domestic retail business unit and would be deployed across even more strategic business areas including finance, administration and HR to increase efficiency and make cost savings.

RPA effects on outsourcing

Automation is not just affecting client adopters; automation is also very much on the minds of executives who lead outsourcing service providers. Offshore BPO and ITO providers aim to massively implement automation in order to stay competitive. For example, Wipro, India's third-largest outsourcing services firm, announced in April of 2015 that it expected to reduce its workforce by about 47,000 people in the next three years because of automation. Over the next few years, we shall see the degree to which clients continue to automate within their own business operations groups or whether they seek to have their service providers automate on their behalf. At UTILITY, both routes were evident.

As mentioned in the section on the business context for RPA, about 50 percent of customer service processes were outsourced, mostly to India. UTILITY had since automated some processes that were run out of India, representing about five to ten percent of the volume of

back office work. The work previously done by the Indian-based provider was now being done by domestically-based robots. It was less expensive for UTILITY to build a robot and run it domestically, than it was to offshore the work. While one might say this work was "reshored", it did not create new jobs domestically.

UTILITY, like other client cases we are studying, was willing to work with its service providers to get them to automate parts of the processes they were performing for the company. UTILITY's outsourcing providers were actually very interested in learning more from the company about how to build a better RPA capability. A key question for a mature RPA adopter like UTILITY is to determine how much of their RPA capability to share with providers.

Strategic RPA Outcomes

UTILITY had two major strategic thrusts: to keep business operating costs low and to improve customer service. Pertaining to business operating costs, RPA projects, on average, yielded a 200 percent reduction in costs compared to the manual process. Pertaining to customer service improvements, RPA helped resolve or prevent the reasons why customers called by for assistance in the first place. By 2014, customer service had improved dramatically in some areas. Although it is difficult to calculate the separate contributions of elevated management attention on customer service, the transformation programs, additional staff, additional training, and RPA, all interviewees concurred that RPA had a material impact on achieving strategic goals. Here are two examples:

UTILITY dramatically improved the percentage of customer bills generated on time. The company used to have a real problem generating customer bills on time; some customers were billed as late as two years after service. UTILITY brought in hundreds of additional staff to focus on solving the issues of late bills. It deployed robots to deal with exceptions. The combined efforts of additional human and robotic FTEs proved successful. UTILITY reduced its late bill backlog by over two thirds.

UTILITY improved customer service. As part of a "customer first" strategy, UTILITY wanted humans to speak to customers for voice activities on the front end, but RPA was used on the back end. RPA was used to reduce the backlog of requested work and to add additional customer features that would have been cost prohibitive or too slow if performed by humans. RPA was used, for example, to expedite the logging of customer complaints so agents could spend more time solving their problems. UTILITY also added services with automation for activities it couldn't do in the past because of limited staff and resources. For example, the robots issued more frequent notification to customers on service status. As a result of the commitment to customer service, UTILITY reduced total complaints by over 25 percent in 2014 and they were clearing over the vast majority of complaints within 24 hours. RPA certainly played a role in this success.

Case Discussion: Mature RPA Capabilities

By 2015, UTILITY's RPA capabilities were very mature compared to most other RPA adopters. It had a well-established Robotic Operating Model in terms of governance, RPA demand management, RPA development, and strategic outcomes. Although it took a few years to reach this level of maturity, client firms just beginning their RPA journey can accelerate learning by examining UTILITY's model.

In this section, we describe the model as of 2015. In the Lessons Learned section we explain more about how clients can move from an initial operating state to a more mature end-state.

Federated governance

> "*UTILITY has RPA ambassadors out in the business offering to collaborate.*" – Senior executive, RPA service provider

At UTILITY, automation was embraced by the C-suite as one tool to help the company deliver service excellence to customers while minimizing price increases through lower operating costs. By 2015, UTILITY had a sophisticated mix of human and robotic workers to meet these strategic challenges. Specifically, the onshore workforce dealing with business process was about 2500 people and 300 robots, with the robots performing the work of about 600 people.
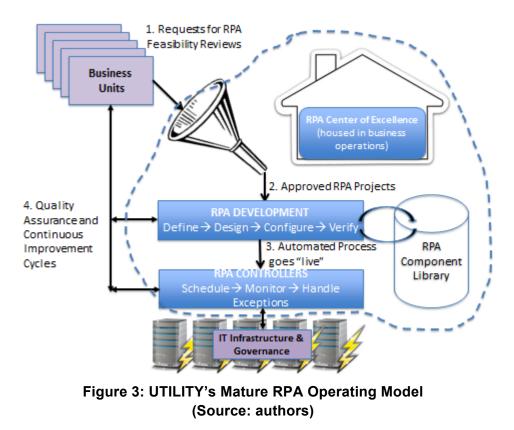
The RPA governance was structured as a federated model. The centralized team, which we will call the Operational Center of Excellence (OCofE), was part of the domestic residential business. Thus, UTILITY's RPA capability was housed in business operations, not as part of the IT department. The OCofE served as the Center of Excellence for RPA and helped other divisions with automation (see Figure 3). The OCofE comprised about nine people, an RPA manager, four developers, two control room staff, a configuration coordinator, and a portfolio analyst. Other RPA teams were housed in three other business units. These were small groups of two to four people.

Demand management capability

The OCofE consisted of two main teams. A Development Team did the work of definition, design, configuration and results verification. The Control Room team then was responsible for operations management and deploying the robotic workforce. Both teams complied with the IT function on governance, security, and compliance.

As a company with mature RPA capabilities, demand for automation could come from anywhere within the company. Demand for automations typically came from customer transformation programs and from operational teams in the business units. Demand was quite high, with anywhere between ten to 30 processes somewhere in the development cycle. Candidate processes for automation were put through the pipeline where the OCofE assessed its automation worthiness. First, the OCofE gathered local work practices, also known as standard

operating procedures. The team also needed transaction volumes and transaction frequencies. It needed to know response time, for example, and whether there were backlogs of work. The OCofE, in cooperation with the requesting business operations area, developed a business case if automation looked promising. With clear instructions on how the process worked and what the transaction times were, OCofE produced a project initiation document. That document was then signed off by the business users, the automation developers, and any other invested parties before the development started.

Figure 3: UTILITY's Mature RPA Operating Model
(Source: authors)

The typical RPA business case

As UTILITY's RPA capabilities matured, it developed more ambitious business cases to help prioritize the high demand for automation. As of 2015, the business case usually required automation to project a benefit of at least a 200 percent reduction of costs within 12 months compared to the manual process. All costs and benefits were included in the estimates. The costs of RPA included technology costs for software licenses, hardware, IT service costs, and RPA staff costs. The financial benefits of RPA projected FTE avoidance, FTE redeployment, and/or FTE savings. FTE avoidance occurred when UTILITY used robots to complete work rather than employ, recruit, or move internal staff. FTE redeployment occurred when the company used robots to release humans for other work. FTE savings occurred when robots were used to reduce actual headcount in some of the outsourcing relationships. Besides cost benefits, other benefits were projected. RPA also had the ability to work faster and longer hours;

one robot deployed at UTILITY could normally do the work of between two and five FTEs. Robots could technically work continuously, but robots at UTILITY typically ran 17 hours per day because of IT restrictions or business process operations.

The development and operation teams

The OCofE used RPA developers to build the automated solutions and a Control Room team to operate the robots once they were in production. The RPA developers were heavily involved with business stakeholders and operations team in the beginning. The RPA developers documented the project, developed the RPA solution, tested the solution by verifying results, then handed it over to the control room team once the robots were live. The control room team then took over full management of the live RPA process, including interacting with the business operations folks to coordinate the daily stream of work, the output reports and exceptions. Besides the normal control room work, OCofE aimed to continually improve the solution. The control room team also received change requests directly from business operations users, which it handed back to the RPA developers. So the cycle continued.

Skillsets

A mature RPA capability has a well-developed idea of the skillsets needed for the various RPA roles. UTILITY certainly did; it looked to recruit RPA developers from among the operations staff who possessed a strong understanding of the business, a logical mind, and preferably had a systems analysis background. The overriding requirement to be on the RPA team is to be able to extract logical structures from chaotic business data so that prescribed algorithms can be built. IT skills were also valued, but one manager said, *"We're not IT staff but we have staff with IT skills."*

For the control room staff, UTILITY looked to recruit people who were organized, methodical, logical and had a consistent approach to work. Controllers needed to plan the day and organize the workload vis-à-vis other system priorities such that the correct work was sequenced and the correct numbers of robots were activated. The control room staff also needed good communication skills because they interacted with business operations people when they spotted any issues or anomalies.

One astounding fact about the control room team was that there were only two people controlling a workforce of 300 robots. At peak times, these two controllers orchestrated the work output equivalent to 600 or more people. An RPA service provider executive explained, *"You know, when you think of that compared with a typical human workforce structure where you might have a team leader per ten or 20 people and then you've got an operations head maybe in charge of 50 people, you're replacing seven to ten managers with just two people. That's another interesting cost-saving dimension to robotics really."*

Lessons Learned

As an RPA pioneer, UTILITY's journey to RPA maturity took a few years because there were no prior trailblazers to follow. It had to learn lessons for itself. Fortunately, the case offers clients just beginning or even midway their through their automation journeys an opportunity to learn ten valuable lessons.

1. Strategic RPA requires cultural adoption by the C-suite

One RPA provider we interviewed, has found that the clients who get the most business value from RPA have strong support from the C-suite of executives. The Director of Professional Services explained, *"The sites where RPA value has gone exponential is where the organization has culturally adopted automation in the C-suite, with the C-suite pushing it and driving it forward."* This cultural adoption was evident at UTILITY. UTILITY's CEO was the evangelist for the transformation programs and the role technologies, including RPA, contributed to them. He spoke about RPA to C-suite executives throughout the company's regional divisions. The level of awareness and support is vital to an enterprise RPA capability. So how does one get the support of the C-suite? Initially, some key managers in customer service had prior exposure and experience with RPA. They served as champions of RPA and had the clout to warrant attention at the C-suite level. The C-suite understood that RPA could improve customer service and reduce costs.

Talking about some other RPA adopters, an RPA provider found that RPA delivered less value when RPA adoption was pioneered by middle managers with limited influence. The Director of Professional Services for an RPA provider said, *"Where we see a lack of exponential growth, it's in just divisional implementations where the breadth of influence over the organization is just not wide enough for it to go any further. People across the organization look at RPA as some sort of curiosity. Whereas when you've got that C-suite buy-in, that's when you really get the traction."*

2. Let business operations lead RPA

Who should own RPA programs—business operations or IT? At UTILITY, RPA adoption began in business operations and has remained in business operations since its inception. Our evidence is that this is consistent with previous implementations and true for a range of clients.

At UTILITY, the OCofE was confident that the decision to let business operations lead RPA was vital for success. OCofE had control over the use and exploitation of the robots within the business and within a good governance framework, which meant IT trusted the OCofE. The OCofE didn't have to go through an IT governance steering group to get approvals, which would have slowed the process. Over time, the IT department actually realized that housing the RPA program in business operations was advantageous to its own strategy; it could focus on core IT programs like ERP rather than deal with long lists of RPA requests from business operations.

3. Send the right message to staff

Across our case studies, we have seen clients primarily use RPA to automate very repetitive and boring work, freeing up internal staff to work on tasks that are more varied, complex, and interesting. So far, we have not seen internal layoffs directly attributable to RPA—the internal staff has been redeployed to other business activities or RPA helped to avoid adding headcount. When staff are not threatened by RPA, they welcome the benefits of fewer repetitive tasks into more customer-facing roles. At UTILITY, RPA has been around for so long that it is not perceived as a threat. To the contrary, the staff viewed RPA favourably. The operations staff has seen a legacy of prior automation projects that freed people from tedious tasks to focus on more interesting work. One senior executive told us: *"People see automation as an opportunity to improve what they do."*

In other companies new to RPA there will still be initial anxieties. According to Director of Professional Services at an RPA provider, this can be dealt with: *"How do we remove this fear? I'm going to lose my job; the robots are coming; they're going to take my job off me. Remove that fear by selling the positives, the values associated with what it'll mean is as human beings you're not having to do the boring mundane jobs anymore, that you can focus on the value-add jobs like interacting with customers."*

4. Evolve the composition of RPA teams over time

After ten years of adoption, UTILITY had developed a mature, federated RPA governance structure where most of the RPA capability was in-house and relied on the RPA provider for consulting. This mature end-state began with a very different team composition.

When UTILITY first adopted RPA, the provider trained about four client employees and provided mentoring, consulting and co-development for the first set of automated processes. Initially, the RPA team composition comprised about 80 percent RPA provider staff to 20 percent UTILITY staff. By the time UTILITY adopted its fifth process nine months later, the ratio had flipped. The RPA team ratio became about 20 percent RPA provider staff to 80 percent client staff. Once UTILITY reached maturity, the provider's role became more advisory. An RPA provider account manager, said, *"Most of the consulting time is consumed for expansion and for helping the customer with ongoing best practices, upgrades, migrations, and the occasional complex system they may wish to deal with. So we are a trusted advisor and mentor rather than a body shop."* UTILITY's RPA team composition evolution was typical also among other cases we studied.

5. Identify process and sub-process attributes ideally suited for automation.

In the discussion section, we saw that UTILITY had a mature demand management capability to identify processes that were worth automating. A more accurate description would be that

UTILITY and other RPA clients automate *sub-processes*. An end-to-end process usually will have many sub-processes, with some of those sub-processes being more suitable for automation than others. Within an end-to-end process, UTILITY automated a range of sub-processes from as high as 100 percent of the sub-processes automated to as low as two percent of the sub-processes automated.

UTILITY learned that the processes or sub-processes (hereafter we use "processes" for readability) that were ideally suited for automation possessed the following technical attributes:
- unambiguous rules
- limited exception handling
- high and predictable volumes
- operated in a stable environment
- accessed multiple systems
- known costs

The ideal processes had **unambiguous rules** because robots required precise instructions. The process needed **limited exception handling** involving analysis, judgment, perceptual, or interpretive skills. These kinds of exceptions were handled best by humans and if there were too many exceptions, it typically was not worth automating the process. At UTILITY, robots handled backlogs of work or enduring business-as-usual volumes. **High volumes** often drove the business case for automating. Computing resources could be allocated in advance when the process had **predictable volumes**. Volumes need not have been stable—they certainly fluctuated with daily, weekly, monthly, or quarterly cycles—but they needed to be predictable within a range for smooth performance. The ideal process operated in a **stable environment**; if the interfaces changed, the robot needed to be reconfigured to accommodate the change. For example, if the robot accessed a system that had new features added, like new menu items or new option buttons, the robot needed to be reconfigured. Robots were very quick at logging on and off **multiple systems,** much faster than humans, which both reduced labor costs and increased speed.   UTILITY also needed a clear **understanding of the costs** of a manual process so it could calculate whether the business case was strong enough to warrant automation. Typically, the cost of a manual process was calculated by considering the standard unit of time/average handling time it took a human to complete the process times the resource costs (salary, wages, overhead, etc.).

6. Prototype continually as RPA expands to new business contexts

At UTILITY most processes are subjected to a phased approach. The OCofE does a phase one that gets the process up and running, knowing full well that a secondary development may come along to give further improvement. Since every context was slightly different, and there was always something new to learn, UTILITY was in state of "continual prototyping". Whenever RPA was going to be deployed for the first time to a new system, UTILITY recruited a small team to prototype a simple process. Once the simple process was up and running, the team was expanded to add more functionality.   An incremental approach allows the OCofE to

manage expectations and also makes sure that the foundations are robust, secure and actually work as expected.

7. Reuse components to scale quickly and to reduce development costs

As UTILITY built a library of robotic processes, they were reused on other automation projects. Business operations groups now understood the technology and were increasingly asking the OCofE: "Can you automate this? You've done another one similar and I've seen other departments use automation, can you give us a solution?" With RPA, the turnaround time was much faster than for requested changes in the mainframe system. The RPA provider account manager explained further how component reuse lowered the development costs. He said, *"It's a self-fulfilling prophecy, the more processes you automate, the more objects you build in your robotic library, therefore, the more reuse you get, therefore, the assembly and delivery costs of those objects into new processes becomes more and more economic."* As of summer 2015, the development times for implementing an RPA project had been reduced between 30 and 40 percent because of the reusable components.

8. Bring IT on board early

> *"IT needs to be involved…As clients build a virtual workforce, they have to make sure that a robot can have access to a system because there'll be someone in information security somewhere that says only humans can access a system."* — Director of Professional Services, RPA Provider
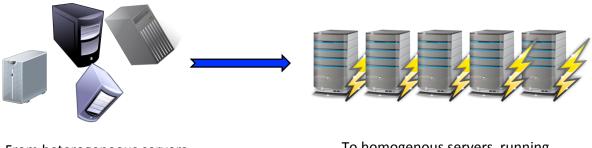
Although the OCofE was observant of all IT policies, practices, procedures and governance, it did not, like other early RPA adopters we have studied, initially involving IT. In most customer cases we have studied, the reasons for excluding IT at the onset were (1) the RPA program was seen as a business operations program since RPA required process and subject matter expertise, not IT programming skills, and (2) fears that IT would beleaguer the adoption with bureaucracy. In all such instances, hindsight indicated that this was not the best approach; customers learned the importance of involving the IT department from the beginning to address their quite legitimate concerns.

The most influential evidence to convince IT that RPA was enterprise worthy has been its performance record; the RPA software used by UTILITY had never caused an IT outage in eight years of operations. Even with this performance record, a good relationship with IT must be maintained over time; it cannot be just a matter of an initial green light, because people come and go in organizations. New IT employees at UTILITY, for example, occasionally blamed RPA for network congestion and had to be educated about RPA just as prior IT employees had been educated. As part of stewarding the relationship with IT, the RPA team kept IT informed of any large RPA changes.

9. Build a robust infrastructure

> *"Optimization of virtualization in the run time environment matters. Poor optimization can make robots slower than people."* — Sarah Burnett, Vice President of Research, Everest Group

Another IT-related issue is the RPA technical infrastructure. Like most client adoptions that begin in business operations, the UTILITY team loaded the RPA software on its existing servers.   The RPA "infrastructure" comprised servers with different power, memory, and operating systems which caused disparate performance and complicated management oversight. Once RPA was elevated to a strategic level, a uniform infrastructure was built (see Figure 4). The RPA provider account manager, said, *"They have a brand new shiny infrastructure which is delivered by one of the outsourcers. They've got 300 identical robots on the very latest servers in a shiny new data centre. So that's brilliant."*

From heterogeneous servers running in several locations

To homogenous servers running on a uniform infrastructure

Figure 4: Enterprise RPA

10. Consider RPA as a complement to enterprise systems

Initially UTILITY thought that the ERP system would decommission all the robots, but it soon discovered that RPA complemented ERP.   UTILITY discovered that no enterprise software package can do everything, so RPA could automate processes not covered by the ERP system. The Director of Professional Services for a major RPA provider explained to us how RPA complements large enterprise systems: *"As we all know with a huge enterprise implementation, it doesn't always deliver everything that it was expected to deliver. There are always things around the edges that never get done, so people have to step in. So what we're actually finding as an offshoot is that RPA has become an enabler, a complement to an ERP program because we effectively finish it off."*   Another issue at UTILITY was that the enterprise system left

UTILITY understaffed since it had projected huge FTE savings in the initial business case. Rather than hire all the staff it needed to support the enterprise system, RPA was deployed.

Conclusion - A Future With Robots on Demand?

Much has been predicted about the effects of automation on the nature of human work. Some pundits expect that automation will leave very few tasks for humans other than lawn mowing and hairdressing. Based on our case study research at UTILITY and other client firms, we predict a different future for the automation of knowledge work.   In the next five years, we think that workgroups increasingly will comprise both human and robotic FTEs, and each will be assigned tasks for which they are ideally suited. The robots will very quickly extract, consolidate, and re-arrange data for humans to make judgements upon. We are seeing this today, but in the future, the robots might not need as much pre-configuration or as much structured instructions. UTILITY wanted to next tackle unstructured data with automation. It wanted robots to read unstructured text, such as text messages or emails, and decipher what it means. The benefit is that robots are very fast, and the ability to rapidly process huge amounts of unstructured data and present an interpretation in real time would greatly enhance customer service. In the future, an agent on the phone with a customer might immediately ask a robot to mine a vast amount of data to help complete the customer call within seconds.   Imagine when a human worker in the middle of a task could just demand a robot when needed—a Robot-On-Demand.

About the Authors

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