The Social Construction of Technology and Robotic Process Automation

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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In the past decade, there have been tremendous advances in computing and artificial intelligence (AI). Many of these advances are now being widely adopted in the industry, where businesses are prioritizing the modernization of their technology platforms and the implementation of new technologies so as not to be left behind (Chui & Malhotra, 2018). One of the most popular new technologies being adopted is automation, a process in which computers perform functions automatically without human involvement.

Robotic Process Automation (RPA) is a lightweight variant of automation that is considered to have great potential. Favored for its ease of use and its low-impact implementation, RPA promises increased efficiency and savings for many companies. RPA is well-suited for automating repetitive tasks done on computers, making it an attractive choice for many traditional offices around the world.

The implementation of RPA, and automations in general, will be challenging in many ways. A successful implementation process requires the support of many stakeholders and groups within the organization which must be coordinated to facilitate a smooth deployment (Lamberton, 2016). Particularly, as RPA takes on duties formerly performed by humans, there must be clear and transparent communication to workers how their roles will change and how they will see the benefits of RPA.

In this analysis, the Social Construction of Technology (SCOT) framework will be applied to analyze the ability of RPA implementation efforts in overcoming those challenges and achieve a successful outcome. To understand the challenges associated with introducing automations, a recent implementation of RPA in a UK-based technology company will be investigated using the SCOT framework. The analysis will demonstrate that SCOT, by considering organizational stakeholders individually rather than in aggregate, is better suited than

other organizational technology adoption frameworks to analyze the key components of a successful RPA adoption.

AUTOMATION IS COMING

For as long as people have been doing work, the nature of that work has always been changing. New technologies are constantly being developed and implemented with significant impact on the lives of workers. David Nye, a noted historian of technology, has explained how the assembly line reshaped work: skilled artisans, who knew how to make a product from start to finish were pushed aside in favor of, "specialized machinery and the subdivision of labor" (p. 111). This produced a societal trend of deskilling workers as they were pushed towards tedious assembly-line work and the factory system took hold.

In the present, automation demonstrates the same potential as the assembly line to disrupt and change the nature of work. Thanks to advances in artificial intelligence, computers are able to take the initiative and operate more independently in various domains and the possibilities of automation have expanded dramatically.

Businesses have been quick to react and many are adopting automation in their existing processes. The piloting of robot janitors in Walmart stores is just one example of the rapid adoption of automation by companies (Harwell, 2019). One industry survey, conducted by global consulting firm McKinsey, showed that 47 percent of respondents had adopted AI and automations in some capacity while another 30 percent were piloting it (Chui & Malhotra, 2018, p. 2). This trend is likely to continue, with 71 percent of respondents in the same survey expecting to increase spending on AI and automation in the future (Chui & Malhotra, 2018, p. 2).

As the trend towards increased automation continues, it has received increasing attention. There have been fears that increased automation will permanently displace a large part of the workforce. One *Washington Post* article suggested that such an event would occur as early as the next recession, during which companies would decide that human workers were too expensive to retain as compared to their computer alternatives (Dam, 2019).

But many experts disagree, arguing that job losses would be offset by the creation of new jobs enabled by automation (Muro, Maxim, Whiton, & Hathaway, 2019, p. 14). Historically, this has been true of other technological advances, which augmented the capabilities of workers rather than directly replacing them (Nye, 2006). This appears to be the case for automation as well. One case study from the London School of Economics found that automation is being used to increase productivity rather than to cut costs and reduce the number of workers (Willcocks, Lacity, & Craig, 2015, p. 7). This suggests that fears of humans being replaced appear to be unfounded. However, automation will introduce other challenges, many of which are being encountered as RPA is piloted in more workplaces.

ROBOTIC PROCESS AUTOMATION

The forefront of automation in workplaces is RPA. Its proponents argue that once implemented, RPA delivers, "much lower costs while improving service quality, increasing compliance, and decreasing delivery time"(Willcocks, Lacity, & Craig, 2015b, p. 4). As

visualized by Figure 1, RPA is functionally equivalent to a robot sitting at a desktop that can be trained to perform various tasks in place of a human worker.

RPA software is the preferred choice of many companies due to its relative ease of implementation. Unlike other automation systems,

Figure 1: Illustration of Robotic Process Automation. The automation does what the human would do at the computer (Gillman, 2019).

RPA is easy to configure and programming skills are not required to implement it (Willcocks, Lacity, & Craig, 2015c, p. 6). According to outsourcing technology experts at the London School of Economics (LSE), RPA is lightweight in that, "RPA sits on top of existing systems – without the need to create, replace or further develop expensive platforms" (Willcocks et al., 2015c, p. 7). These factors make RPA highly attractive to most organizations starting the path towards automation.

As RPA is being rolled out in organizations, many novel challenges are being encountered. RPA is often misunderstood by management. This can result in RPA being applied to the wrong problems, producing a subpar automation that is unsuccessful in increasing efficiency and reducing costs (Lamberton, 2016). Even when RPA is applied to an appropriate problem area, developers often have difficulty identifying the correct processes to automate or the best practices for implementation because RPA is so new (Lamberton, 2016, p. 4).

In addition, as RPA is being adopted by an organization, there may be resistance from various stakeholders within the organization. RPA developers are typically based on the business side of an organization, leading information technology (IT) departments to regard RPA as an incursion by business teams into their domain (Willcocks et al., 2015c, p. 14). Senior leadership may be disengaged from RPA initiatives, which can negatively impact chances of success. The workers whose responsibilities RPA will be taking on are often suspicious of RPA as well. There is commonly poor communication to those workers about how their job roles will change or be transitioned, leading many to mistakenly fear for their jobs or be uncooperative with RPA developers (Bovaird, Kundu, Moir, Sanmugananthan, & Turk, 2017).

Overall, there are many challenges to adopting RPA which span social and technical factors and involve diverse parts of every organization. For RPA to be successfully adopted by an organization, the management, technology and business teams must all be aligned. The current theoretical frameworks for technology adoption in organizations do not account for the need for internal alignment, as they typically consider the organization as an aggregate, not a set of stakeholders that are frequently at odds (Oliveira & Martins, 2010). As a result, these frameworks do not offer guidance on overcoming resistance from these internal stakeholders to adopt RPA in an organization. This is where the Social Construction of Technology framework can be applied to fill the gap.

SOCIAL CONSTRUCTION OF TECHNOLOGY

SCOT is one of the two dominant theories in the field of Science, Technology, and Society (STS). Developed in the 1980s by sociologists Trevor Pinch and Wiebe Bijker, SCOT holds that the development of technology is fundamentally shaped by society (Kincsei, 2007).

SCOT is the opposite of technological determinism, which maintains that one technology invariably arises as the "best" and is automatically adopted by society. Instead, SCOT asserts that society chooses technology that it perceives to achieve some particular purpose or, "to further the interests of individuals or social groups" (Johnson, 2005, p. 1792). SCOT analysis centers around four core concepts: relevant social groups, interpretive flexibility, closure, and stabilization.

Under SCOT, every new technological artifact is evaluated by its relevant social groups. These social groups may see the artifact in different ways and the technological artifact may hold different meanings to each social group based on their particular attitude. This interpretive flexibility of technological artifacts is the defining characteristic of SCOT. New artifacts will generally be interpreted in different ways by its relevant social groups, driving its further development in response. Successful technological artifacts develop and reach a point of closure and stabilization, where the, "social groups coalesce around one [artifact] because it [solves] problems for each group" (Johnson, 2005, p. 1793). This means that the relevant social groups all have positive interpretations of the technological artifact, making it the dominant form of that technology.

As an example, when automobiles were first introduced in America, they were viewed by urban dwellers and suburbanites as a convenient means of transportation that greatly expanded their mobility and freedom (Kline & Pinch, 1995). However, farmers, another relevant social group, who could not afford automobiles, saw automobiles as a noisy, potentially dangerous disruption in their lives and attempted to pass legislation against them (Kline & Pinch, 1995, p. 9). Automobiles only became ubiquitous once the Ford Model T was introduced and made affordable for farmers. Once the Model T was in the hands of farmers, they quickly saw the

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advantages of automobiles. From a SCOT standpoint, the automobiles were able achieve closure and stabilization by reversing its initial impression by farmers.

Currently, there have been few or no attempts to analyze the success and failure of RPA using SCOT. However, SCOT is an appropriate framework to guide and analyze the implementation of RPA. The framework can help to understand the stakeholders involved in the RPA adoption process. As Figure 2 illustrates, RPA involves many stakeholders: the executive leadership introducing it, the business teams implementing it, the IT teams responsible for the software that RPA will be implemented on top of, and finally the workers who will be working alongside the final RPA product.
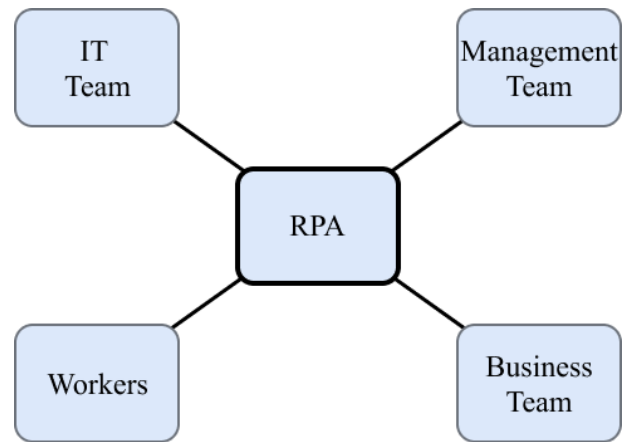
Although RPA is a new technology, there are several papers documenting cases of RPA adoption in organizations. Particularly,

Figure 2: Stakeholders involved in RPA. (Xu, 2020).

an in-depth study on RPA adoption at the technology firm Xchanging was conducted by the LSE outsourcing experts mentioned previously (Willcocks et al., 2015b). By analyzing this case through a SCOT lens and considering the implementation effort as a process of aligning the relevant social groups (stakeholders) to achieve closure and stabilization, it will be shown that SCOT has significant advantages in its ability to analyze technology adoptions by organizations.

RPA AT XCHANGING

Xchanging is a UK-based technology outsourcing firm that provides technical services to clients across a variety of industries. Founded in 1998, "Xchanging aimed to perform customers'

non-core and back-office functions better, faster, and more cost-effectively, allowing customers to focus on strategic activity and adding business value" (Willcocks et al., 2015b, p. 6). A significant part of Xchanging's activities was repetitive, manpower-intensive data entry tasks, so applying RPA to those tasks seemed to promise an increase in speed and cost savings.

RPA appealed to Xchanging's executives, because it complemented the company's core innovation and technology offerings while adding increased flexibility to its operations (Willcocks et al., 2015b, p. 8). Xchanging leaders also felt that adopting RPA fit with Xchanging's core values of, "customer focus, innovation, speed, and efficiency" (Willcocks et al., 2015b, p. 8). As a result, the management team, one of the relevant social groups in the organization, had a positive interpretation of RPA and was fully aligned towards closure and stabilization from the beginning of the project.

From the beginning, it was decided that the RPA implementation team would be business-led. Management felt that the business team best understood the use cases for RPA and the company would be more accepting of RPA if it was a business-driven initiative (Willcocks et al., 2015b, p. 16). Moreover, the decision to hand control to the business team ensured that the most relevant social group would have the most influence in RPA's development and would be well-aligned towards closure and stabilization.

Along with ensuring that the management and business teams were aligned, particular effort was made to ensure the IT team was involved and supportive. In the words of RPA team leader Paul Donaldson:

"There were a lot of skeptics in the technology space; it took a lot of convincing to allow business-based operations to take some form of control over what is a decent sized IT

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change initiative, and a different way of operating for us as an organization" (Willcocks et al., 2015b, p. 9).

While the IT team was not directly involved in implementing RPA, it maintained the technology base that RPA was built on top of. By bringing the IT team onside early in RPA's development, the implementation team ensured that IT was fully invested in the project and would be willing to help it scale in the future.

Finally, Xchanging successfully introduced line workers to the project. As these workers would be working most closely with RPA once introduced, it was critical to get them on board. As a technology outsourcing company, Xchanging was already experienced in communicating technology changes to workers and the implementation team was transparent and clear in communicating to workers how their jobs would change (Willcocks et al., 2015b, p. 21). The implementation team also anthropomorphized the RPA automation, nicknaming it "Poppy," which helped workers feel more comfortable. As a result, workers "welcomed the robots as valued 'new hires'" and found more work they thought would be appropriate for RPA (Willcocks et al., 2015b, p. 5).

Ultimately, the Xchanging RPA initiative was successful because the implementation team understood the relevant social groups from the start. The implementation team focused on aligning these groups towards a favorable interpretation of RPA technology. The Business teams were allowed to drive the process, which ensured that the new system would benefit them. The IT teams were also tied into the process, allowing RPA to be seamlessly integrated with the existing technology stack. And workers were reassured RPA was intended to help, not replace, them. This allowed RPA to quickly achieve closure and stabilization at Xchanging, making its introduction a success.

USE OF SCOT IN TECHNOLOGY ADOPTION

As seen in the previous case, SCOT provides an alternate view of the RPA adoption process in an organization beyond the technology adoption frameworks currently in use by organizations. With the expansion of automation and the rise of RPA, many organizations are seeking to leverage its benefits. The two most prominent frameworks currently for analysis of IT technology adoption in organizations are the diffusion of innovation (DOI) model and the technology, organization, and environment (TOE) model. Both models provide valid perspectives, but may not be sufficient.

Under the DOI model, the rate of technology adoption is modeled as a normal curve, with innovators and early adopters on the leading tail of the curve, the majority of adopters concentrated in the curve itself, and laggards making up the trailing end of the curve (Oliveira & Martins, 2010, p. 2). Where a firm falls on the curve is determined by a number of aggregate characteristics, including the size of the organization, its centralization, complexity, and openness to change

The TOE model shares many of the same factors with a focus on the three major contexts (technology, organizational, and environmental) that, "influence the process by which it adopts and implements a technological innovation" (Oliveira & Martins, 2010, p. 3). The TOE model emphasizes the same factors as the DOI model in the organizational context, but also considers a firm's competitors and industry regulations in the environmental context, and the inherent characteristics of the particular technology under study in the technology context.

While these frameworks are useful in gauging the overall willingness and ability of a firm to adopt RPA, they consider the firm as an aggregate of its individual stakeholders. In contrast, SCOT focuses on the attitudes of each relevant social group and is better positioned to consider

how the attitudes of an organization's stakeholders towards RPA would influence the prospects

of its adoption. As a result, SCOT is better able to offer guidance to the leaders of an

organization as they consider not just whether to adopt a RPA, but how to best ensure that

everyone in the organization will be supportive of the adoption process and willing to make it a

success.

Organizations around the world are undergoing drastic transformation; technology has

changed rapidly and there are significant benefits to be derived for the organizations who can

adapt the fastest and adopt the latest technologies. RPA is a technology that can give

organizations the competitive advantage by allowing them to perform faster, cheaper, and more

flexibly.

It is critical that companies adopting RPA manage the implementation process correctly

to ultimately enjoy the benefits of automation. This is where SCOT is able to help an

organization's leaders. Leaders can use SCOT to view their organization as a collection of social

groups and understand the values and goals of each group. They will then be better able to align

these groups towards achieving closure and stabilization, allowing their organizations to

successfully implement RPA and face the future.

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