Robotics at dimension data: friend or foe of the human in process automation?

Michelle Karim, Christina Swart-Opperman and Geoff Bick

Andrew Harmse, product owner of digital at Dimension Data, sat down once again at his makeshift office in his home. Working remotely was becoming more annoying as the year passed. It was July 2020 in Johannesburg, and the email that he had received earlier that morning was a welcome distraction from the tense past few months of working from home during the COVID-19 pandemic. The subject line stood out:

To: Andrew Harmse

Subject: Unacceptable: Lack of response

Dear Andrew,

I write to you following very unprofessional behaviour by one of your staff members. On the 10th of June I received an email from Paysley Mits with monthly reports attached. I responded to the email and requested additional reports to be provided. It is now July and I still haven't received a response which I find unacceptable.

Please can you investigate and advise?

The email had come from one of the financial managers within Dimension Data. The manager was escalating the unprofessional behaviour of one of Harmse's reports. Upon further investigation, Harmse realised that the employee that was being reported was a robot – which explained the lack of reply to the financial manager's email. Harmse would have to carefully word his response to the manager to avoid embarrassment. Being part of a digital workforce, meant that employees and managers across Dimension Data needed continuous support when working alongside robots. Software robots were even tougher to introduce to employees, as they had no physical presence, but were rather represented by ones and zeroes that ran in the background. Harmse grew anxious simply reflecting on this fact. Perhaps his colleague Chris Wiggett, head of intelligent automation at Dimension Data, viewed it differently.

But a Deloitte study [1] had found that only 17% of organisations felt prepared for the human and robot workforce. Dimension Data had come a long way on their automation journey, but it seemed that a lot more had to be done to build awareness of the rules of engagement when working alongside robot colleagues. As the scope and scale of the automation journey accelerated, Harmse took a pause. Up until now, Dimension Data had been able to retrain and redeploy employees who had parts of their work automated. But what would the world of work look like in three to five years from now? How could organisations ensure that employees were ready for the rapid automation trajectory, especially given the recent COVID-19 pandemic which was resulting in demands for quicker change and digital transformation? Another question that had been raised by

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executives was where the accountability ultimately lay if a robot did something wrong? Would it be the business owner, who had assumed responsibility and signed off on the robot's work, or would it be the developer who had instructed the robot? Harmse knew this would require looking at in detail, but first he had to respond to the email. He opened the email and hit reply.

1. Automation Centre of Excellence

When Harmse started the Automation Centre of Excellence (COE) in 2017, he was excited about the opportunities that lay ahead. But being realistic he knew there would be many challenges to overcome. Automation and robotics were some of the new buzzwords alongside digital transformation and there were expectations of overnight results and exponential growth. The COE was created to bring together the automation knowledge and establish best practices and standardised roll-out frameworks, as well as to drive the adoption of automation across Dimension Data. With the necessary knowledge, some funding from the top and unwavering enthusiasm, the COE team set their sights on the possibilities for automation within Dimension Data. Harmse and his team had to prioritise and home in on those opportunities that would show the most value, the quickest. Also, given the limitation in resourcing, the team had to ensure they spent their time wisely and on opportunities that would excite the business and assist with converting the naysayers.

By 2020, the COE had deployed 55 different process automation robots within Dimension Data over the course of three years. The robots ran within the finance, IT, sales and human resources (HR) divisions. Given the success within Africa, Harmse had been approached by the offices in North America, as well as Canada, to assist with initiating their Centres of Excellence. The team were gearing up towards the next phase. Harmse was currently working on automating some of the administration and auditing functions that were associated with the maintenance of the robots they were running. The COE was also tasked with developing robots that could be re-used and sold to their customers.

2. Company background

Dimension Data was founded in 1983 in Johannesburg, South Africa. The company grew very quickly and listed on the Johannesburg Stock Exchange (JSE) in 1987. The 1990s brought investment in IT and infrastructure which led to massive margins for Dimension Data and resulted in the company expanding into Africa and even abroad into the Asia-Pacific region. In July 2000, the company listed on the London Exchange, but this was followed shortly afterwards by the collapse of the dot-com bubble. Almost overnight, Dimension Data faced immense pressure as companies started relooking IT spending. The company's margins dropped from around 50% to 15% in a short space of time.

Dimension Data had to make tough decisions for the business to survive. This resulted in the reduction of employees from 11,000 to 3500. Between 2003 and 2008, the company had to rebuild and reorganise internally for the future that lay ahead, as company executives remained cost sensitive. In 2008, Dimension Data was approached by the Japanese company Nippon Telegraph and Telephone Corporation (NTT) (Exhibit 1) with a proposal to buy Dimension Data. The deal was concluded in 2009 and the Dimension Data brand continued to exist up until 2019 when the decision was taken to rename the entire business outside of Middle East and Africa (MEA) to NTT. The Dimension Data brand (Exhibit 2), due to its regional familiarity, was maintained within the MEA region.

NTT delivered services across multiple continents and industries in the areas of applications, infrastructure, security, customer insights and experience (which included digital transformation and automation). The COE, managed by Harmse, fell within the Dimension Data MEA region but delivered support and solutions to NTT globally as required.

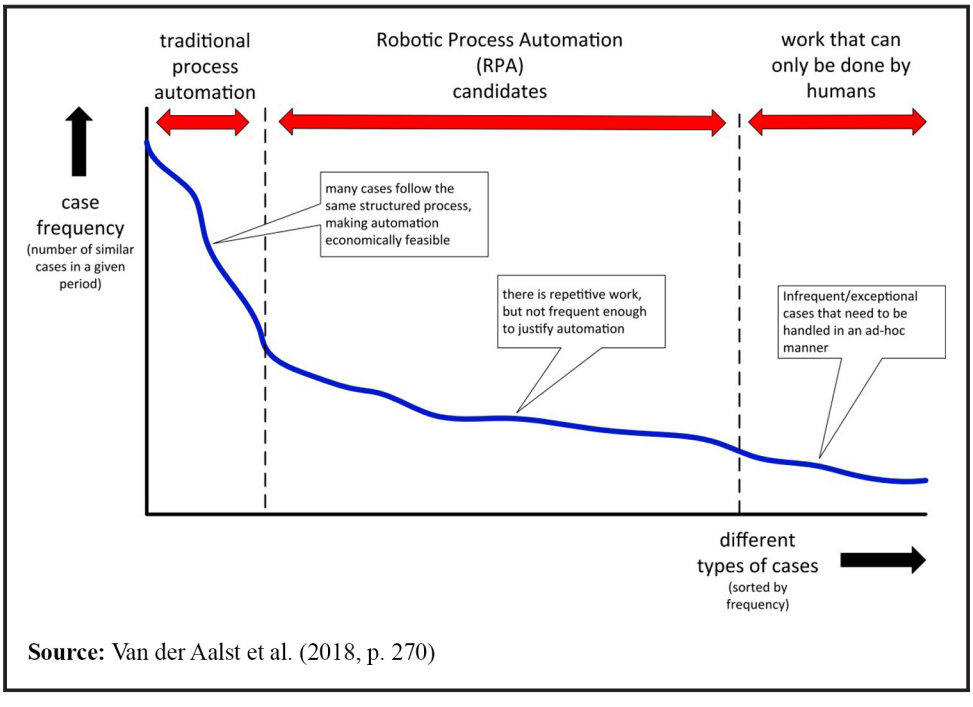
2.1 Robotic process automation

When considering the history of robots (Exhibit 3), as well as the different types of robots (Exhibit 4), it was evident that robots had been around for a long time. The first robot dated back to 350 B.C. and the word "robot" [2] was coined in the 1920s. Robots have been prevalent across multiple industries and as the robotic capabilities developed and advanced, the uses for robots have continued to grow exponentially. There were two main categories of robots, namely software and hardware robots with distinct differences (Exhibit 5). Chatbots, virtual assistants (such as Alexa) and the different types of automation, which included robotic process automation, were examples of software robots.

Throughout each of the industrial revolutions, there were opportunities and threats to human employment and economic growth, but the era of robotics and artificial intelligence, namely, the fourth industrial revolution or Industry 4.0, brought with it uncertainty around the true impact on jobs in the future. Technology-enabled organisations and employees to move away from paper-based work towards digital tools like email and electronic filing. However, the digital move had introduced multiple repetitive and standardised steps that needed to be followed to complete a single process. This was where robotic process automation (RPA) was worthwhile. RPA consisted of a set of instructions that was created to automate structured, repetitive tasks. RPA assisted with tasks like reading data, copying data and entering data into application. If a process was rule-based, RPA could be used to automate the process which would save time and reduce errors. RPA (Figure 1) was at the lower end of the automation complexity scale and enabled organisations to automate low to medium complexity processes that were repetitive and standardised in nature.

> *"Hi, my name is Paysley Mits and I assist Gerry [3] in our HR department. On the tenth day of every month (regardless of the day of the week) I log into our payroll system and download 17 pre- defined reports and proceed to email the reports to a list of employees within our HR and finance departments, with Gerry on copy. I assist Gerry by running these reports overnight, which allows him to focus on more important deliverables. I also ensure that the sensitive payroll*

Figure 1 Types of process automation



Source: Van der Aalst et al. (2018, p. 270)

information is distributed correctly, on time, every time. I am an example of a robotic process automation."

Paysley Mits was an example of an RPA at Dimension Data (Figure 2). Paysley was an employee with a name and employee number (Exhibit 6) and appeared on the company address list. This meant that Paysley would be assigned an email account, as well as login details, that allowed access to the payroll system, to perform the work it was programmed to do. Paysley also reported into a manager, like any other Dimension Data employee, and had to be performance managed. Exhibit 7 shows an example of a finance RPA within Dimension Data.

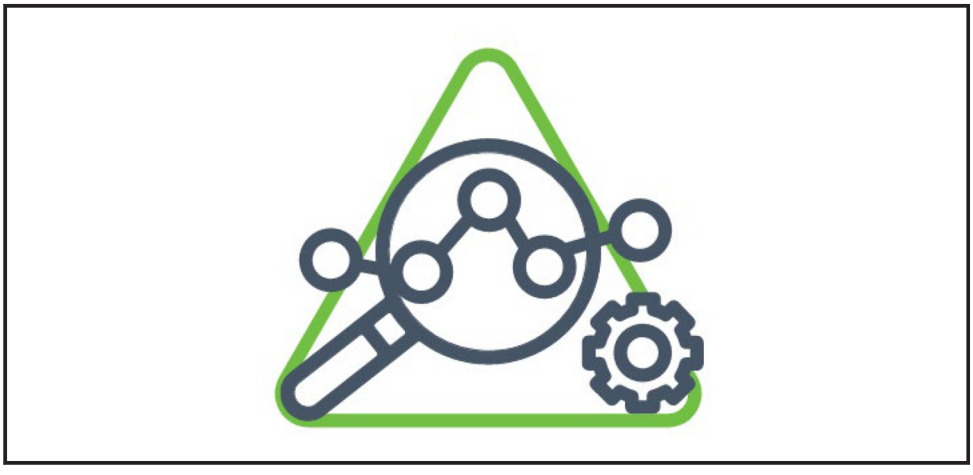
The implementation of RPA not only allowed organisations to free-up capacity of employees to focus on value-added tasks, such as client-facing support and sales, but also resulted in decreased risk and errors. Tangible benefits of RPA included increased efficiency, quicker processing times and improved flow of data that enabled improved analytics and insights. The intangible benefits of RPA included increased employee satisfaction and upskilling. The RPA market was valued at R19,9bn (US$1.3bn) as of 2019, according to Gartner [4], and was set to reach R29bn (US$1.9bn) by 2021.

But RPA came with hidden costs and was not a once-off development. Once built, the robot had to be maintained and updated constantly to stay in sync with the system and process steps it should perform. The robot would also be monitored by an operations team to ensure issues were addressed and downtime was limited. This would impact production outputs and ultimately return on investment. In addition, the robots also incurred licensing and infrastructure costs and depending on who developed the robots, organisations might have continuous vendor costs. Although the once-off development cost of an RPA costs much less than a full-time employee, organisations had to factor in the additional costs, especially when calculating their return of investment period.

2.2 Robotic process automation within dimension data

Dimension Data, like most companies that start out with new technology, was looking for quick wins. They knew that a partnership with one of the RPA providers (Exhibit 8) would enable them to learn from the best and leverage best practice without reinvention and for this reason Dimension Data decided to partner with UiPath. The company was founded in

Figure 2 Practical example of an automated robotic process



2005 and had the best in class available when it came to automation. By combining the development skills within Dimension Data with frameworks, standard operating procedures and platforms of UiPath, the partnership assisted Dimension Data to ramp up quickly when they commenced the COE in 2017.

Within the Dimension Data COE, the company had, over time, customised the UiPath frameworks, and these were used to determine the feasibility and benefits of an automation opportunity. By applying these frameworks and ensuring that the upfront RPA documentation was completed thoroughly and with the necessary oversight and review, the COE team could plan their workload and RPA deployment schedule three months in advance. This visibility allowed the team to manage stakeholder expectations and allowed ample time for the business users to be trained and prepared for the changes that would be deployed.

Harmse and his team used an ideation portal where business users could submit automation ideas which are then evaluated against pre-defined criteria, such as the number of applications that are interacted with during the process, the way information is received and entered into the system– structured or unstructured, and the number of exceptions within the process. These were the factors (Figure 3) that were considered to determine the potential for process automation.

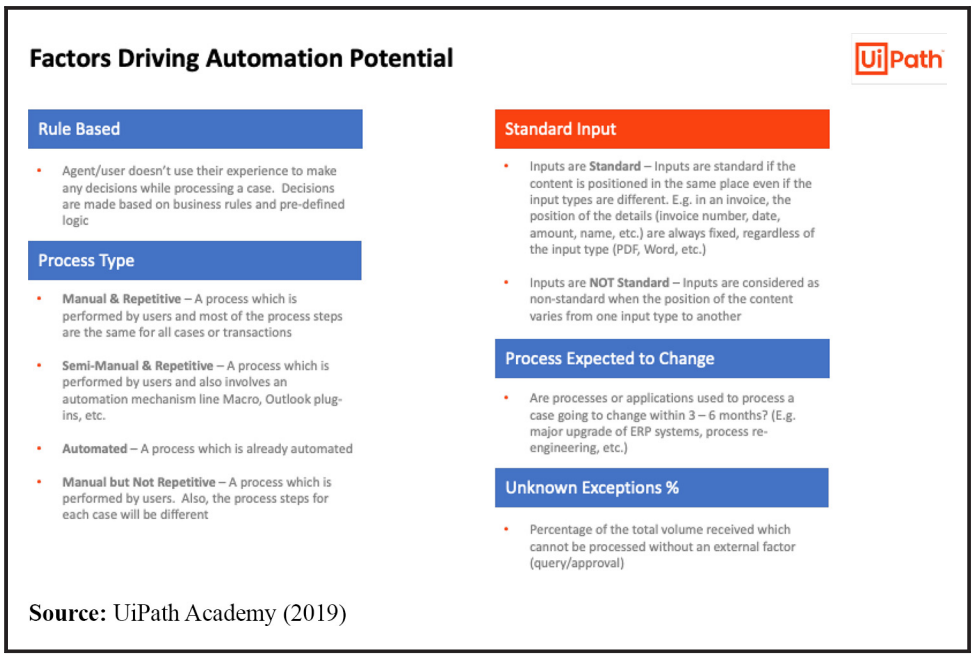
Robotic process automation was however not a long-term fix. Based on current best practice, an automated process had to be reviewed every 18 to 24 months for relevance and required changes.

> *"We view RPA as a stop gap,"* Harmse explained. However, this thinking was not very well publicised, and organisations perceived RPA and the wider automation solutions as once-off, catch-all answers to organisational cost reduction and efficiency improvement plans.

2.3 Digital transformation and disruption

South Africa's automation readiness was in line with global trends: Globally, 94% of *business* decision-makers saw automation as key to driving digital transformation,

Figure 3 Factors driving automation potential



Source: UiPath Academy (2019)

compared with 93% in South Africa [5]. Digital disruption changed the composition of the global top ten companies over the ten-year period from March 2008 to March 2018 (Exhibit 9). Traditional firms such as ExxonMobil, General Electric and Procter & Gamble who were listed in the top ten globally in 2008, had been replaced by the likes of Apple Inc., Alphabet, Facebook, Amazon and TenCent. True to the basic principle of digital disruption, firms that did not even exist in 2008 were able to overtake and completely disrupt much larger firms that had existed for hundreds of years. This disruption happened within a period of just ten years.

Harmse recalled that at a recent United Nations General Assembly [6] in September 2020, the use of "killer robots" was flagged among the top six politically relevant issues that required urgent consideration. Killer robots would operate autonomously and make decisions about killing other humans, without any human control. Ethical and moral concerns regarding "killer robots" had been raised. The other issues that formed part of the top six politically relevant risks were climate change and gender equality. Robot ethics and regulation was at the top of the agenda globally and needed to be incorporated in the digital transformation plan of all organisations.

By 2020, the COVID-19 pandemic accelerated the deployment of automation. A Gartner survey [7] found that 24% of financial executives expected to invest more in RPA due to their workforce being unable to access systems or offices, and also due to cost pressures which had led to job cuts and impacted the organisations' ability to execute tasks reliably. If organisations failed to take all automation factors into account, there would be a risk of globally widening the inequality gap and rising social tensions.

2.4 Robots in the workplace

While the future of RPA was promising, these tools started to raise questions around ethics and the accountability of robots. As technology advanced and companies considered intelligent automation (Exhibit 10), autonomous robots and artificial intelligence, uncertainty and inherent risks began to surface more. Organisations were beginning to rely more heavily on developers [8] as subject matter experts to develop robots (whether physical or software robots) that would act in the best interest of humans. Developers would code robots with a set of initial rules and instructions and the artificial intelligence then learnt from the tasks and processes it completed. An example was a robot working alongside a human resources (HR) colleague, monitoring the responses to HR queries. After monitoring 1,000 emails, the bot was able to generate its own email responses to queries, and after 10,000 queries, the bot was able to take over the HR query handling role completely [9].

Artificial intelligence (AI) had *been* developed for robots to learn, solve problems, plan and reason, similar to the human cognitive function. The principle upon which artificial intelligence was developed, was that it learnt and taught itself without human governance. But AI lacked empathy and instinct which brought in the fear that humans could not be certain how a robot would react when faced with a new situation. How would an autonomous robot apply judgement? Could it be influenced by the initial code and instructions? What if the code or the data that the robot was exposed to, had inherent biases?

A practical example would be the decision an autonomous car would make when it realised it had to choose between an accident in which its passengers were hurt, or the choice to knock down a pedestrian. Society and managers were placing trust in the developers of the smart robots of the future but there were no guarantees. If something were to go wrong, who would be held accountable [10]? Would it be the robot, the developer or the direct manager?

The long-term ethical concerns around robots included the impact on jobs, specifically job loss and wealth inequality. A recent McKinsey study [11] found that the demand for

physical and manual skills within Europe and the USA was set to decrease by 30% over the next decade. In South Africa, 35% of jobs were said to be at risk, according to Accenture [12]. This had the potential to create an increase in unemployment, or it could otherwise assist in creating new jobs for humans, while robots focused on mundane tasks. Robots did not earn a salary nor pay taxes. This could create wealth inequality if wealth creation began to accumulate in organisations, and if minimum wages were not implemented for the unemployed. Forrester [13] reported that 32% of organisations were prepared for RPA's technology implications, but only 12% were prepared for the people implications. How would an organisation manage the "automation run-away train"?

As early as the 1800 s, disruptive technology caused uncertainty and violent uproars. As men's stockings were being replaced by trousers and the first industrial revolution brought about the knitting machine, workers protested against the changes in the textile industry. The Luddites [14], said to be taking their orders from a "General Ludd", raided textile workshops in Nottingham, England almost every night, leaving knitting machines shattered in their path of destruction. The skilled artisans protested against the appointment of lower-skilled workers to operate the knitting machines. The protests and destruction were an expression of the fear and uncertainty the artisans felt towards the industrial capitalists.

As robots became more prominently used in companies, as for example the interview and screening processes within HR or evaluating home loan applications in banks, the long-term implications [15] needed consideration. For example, should a robot be prone to any bias or illogical thinking? These decisions had the potential to cause irreparable damage and needed to be considered and planned for as part of the implementation process. Managers needed to carefully consider the benefits and challenges that new technologies brought into the workplace and recognise that people were required to work alongside machines to ensure future success.

2.5 Change management and human resistance

Chris Wiggett, head of intelligent automation at Dimension Data, had the view that the fear associated with robotics and automation was in many instances an age-related factor.

> *"People hear the word RPA and find it daunting, but at its core RPA is actually quite boring and you really do not need to be able to code in order to do RPA,"* said Wiggett.

Having been involved in the implementation of many automation projects, both internally within Dimension Data, as well as externally through the implementation in client organisations, Wiggett had experienced this employee fear of new technology. It was largely due to their own insecurity with regards to skill set.

To prepare employees for the future they needed to become digitally savvy. In Dimension Data's experience, they had focused on those employees that were willing to participate and showed interest when they were introduced to RPA. Microsoft Excel became mainstream in 1985 and yet there were still very few employees who considered themselves confident with the use of its basic functions.

In 2019, Dimension Data launched their 18-month technical acceleration program to get unemployed graduates under the age of 30 into the business and for them to get existing employees excited about technologies like RPA.

> *"When an employee in a team has managed to develop their own RPA, it creates natural competition within the team and thus converts more employees,"* said Wiggett.

The UiPath best practice considered change management and stakeholder buy-in key to the overall successful execution of RPA. This, combined with a pilot or proof-of-concept where employees and the wider business could see the potential, formed the basis of the acceptance process of this technology solution.

Even if the initiation and implementation process was followed to a T, they still had some employees who refused to work with the RPA and reverted to their old ways of working.

> *"In some instances, we have had discussions with employees directly about not following the process and then we have had to escalate to their managers. We have, on the rare occasion seen employees, not sabotaging the process, but withholding information and then complaining that the robot is not working correctly. In these instances, the team would go back to check requirements and then show that the robot's failure is due to a human issue and then resistors have to be addressed directly,"* explained Harmse.

RPA did impact some jobs and functions, through full automation and organisations needed to be transparent about this fact when engaging with their employees. But RPA would also streamline and improve certain roles, if employees were willing to work alongside the RPA robots. PwC reported [16] on people, change and robots, by raising a valid question: *"how do we help knowledge workers shift to new, efficient ways of working in a constantly changing environment?"* Organisations had to ensure their employees were supportive of the digital transformation strategy, were empowered and trained to use future technologies, and were clear on their future.

Michaela Voller, people and culture executive at Dimension Data, in an interview with Mail & Guardian [17] remarked: *"These are massive mindset shifts and we are encouraging and empowering our people to consider these changes and make this a success in our business. Our transformation journey is not nearly over, as we look forward to further exciting challenges ahead. In our world today, change, after all, is the only thing we can be sure of."*

2.6 The role of the Centre of Excellence

The COE was established to create the understanding of automation and to clarify misunderstandings around tools like RPA. The COE was also critical to stay on top of new technologies, to study them, and to ensure the business made informed decisions. Organisations could easily make poor decisions and automate the incorrect processes. A COE was therefore key in any automation and wider digital transformation journey, to review ideas, prioritise them and assist in selecting opportunities that would deliver the quickest return on investment (ROI). In the case of the Dimension Data COE, they were also responsible for development of the automation solutions, knowledge sharing, documentation for audit purposes and for maintaining best practice and lessons learnt.

Once a robot had been implemented, it was important to manage the robot's outputs. Since the robot was not a physical person, they were sometimes forgotten. But it was crucial for ROI to maximise the robot's operating time and minimise down time by ensuring that issues were resolved as quickly as possible for the robot to complete the required work. The last and most important function of the COE, according to Harmse, was to educate users on how to engage with a robot.

> *"When we started, robots were loaded as normal employees onto the HR system to arrange the necessary system access for them. The access included an email account which would be used to alert the business users and the COE if a robot had completed a task or if there was an issue with a task,"* he explained.

There were, however, instances of colleagues trying to set up meetings with the robots via Microsoft Teams or even trying to call the robots. This was something the COE needed to iron out to ensure that employees knew emails were from a robot.

2.7 Will humans work with, or for robots?

The COVID-19 pandemic was forcing organisations to fast-track investment into automation. As more investment entered the RPA market, it would grow and expand exponentially. Jobs

as they had been known would keep changing in future, with mundane repetitive tasks being done by robots and allowing humans to focus on those tasks that required creativity, judgement and empathy. But all technology and advancements came with new unknowns to consider and plan for.

The day was ending but Harmse was still at his desk. He thought about the steps he had taken since receiving and replying to the email from the financial manager earlier in the day. He had initiated a meeting for his team to discuss and plan for the many future unforeseen encounters, such as the ignorance of the robot employee. The COE would have to assist the business and HR with training and awareness of employees on the protocols and anomalies that awaited them, as more robot co-workers entered the workplace.

Harmse thought back to a recent interview[xvii] he had read with Voller and her words resonated with him: *"We have had a robotic expectation of human performance for far too long. And the real value of humans is that they have empathy and EQ and can make mistakes. So, where we want a process delivered and done by a robot, we want it fast, accurate and it must be scaled. Robots are taking that mundane and tedious work away from people and allowing people to do the stuff they are more suited to."*

He started to feel excited again. It was similar to how he had felt in 2017, when he had first started the COE. But he was also slightly overwhelmed by the mammoth task and many uncertainties that awaited the company as the automation tools become more autonomous. Who would be responsible for robot errors? On the question of robot ethics, who would define the rules and ensure that biases and discrimination did not materially impact the business, its clients and employees? What would the ultimate impact be on jobs in the future? In drafting his response to the financial manager's email, Harmse realised that this would need to be handled carefully given the sensitivity of staff-robot interactions. He would need to ask the team to add a "Do not reply" to all future emails being sent out by the robots at the end of the email, to avoid frustration from colleagues. He would also have to think of a way to limit the Microsoft Teams calls made to robot employee accounts. But right now, he needed some perspective. He got up to step away from it all.

Keywords:
Innovation,
Human resource management,
Strategy,
Disruptive technologies,
Digital transformation,
Change management,
Robots,
Robotic process automation

Notes

1. https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Financial-Services/gx-fsi-automation-here-to-stay.pdf
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3. Not his real name.
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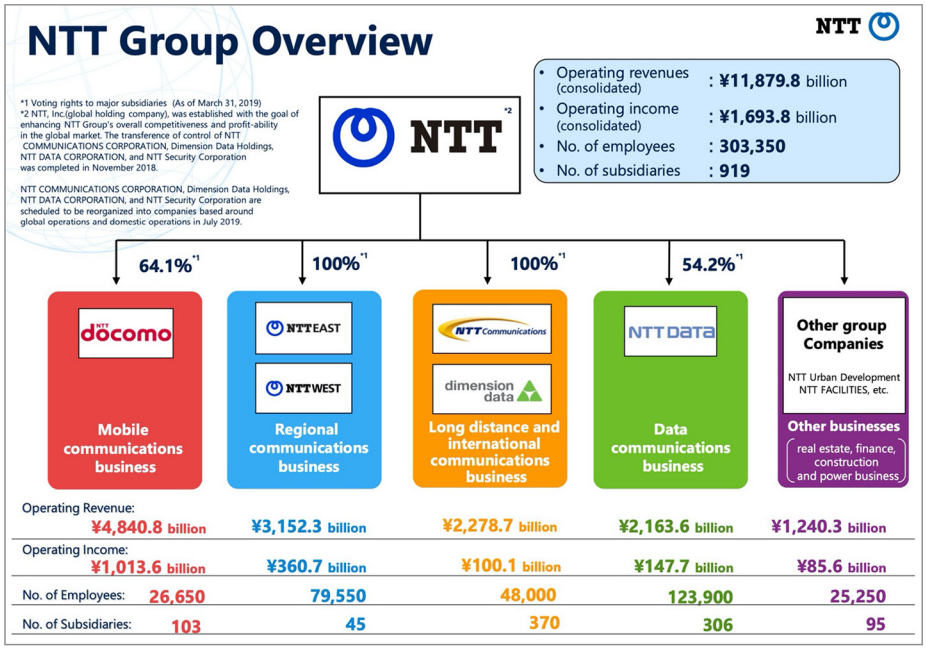
Exhibit 1. NTT Group overview (2019)

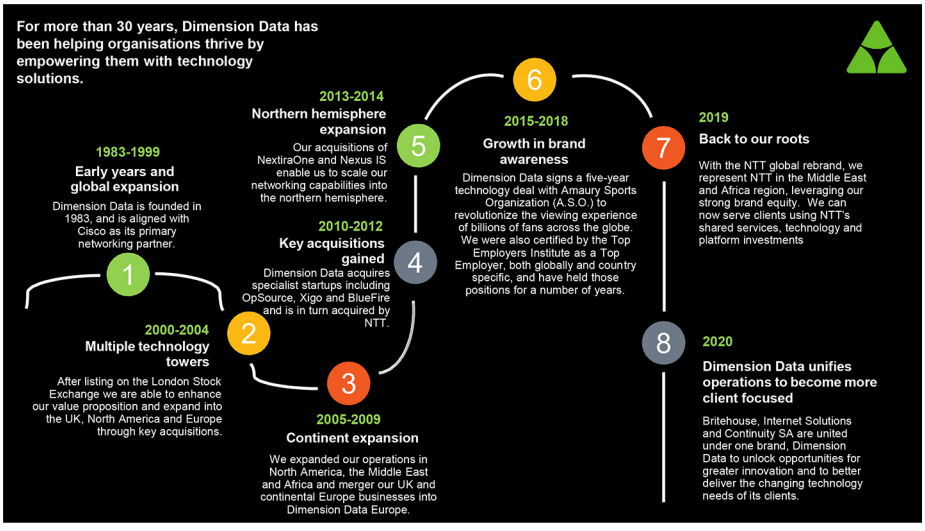
Figure E1



Source: Nippon Telegraph and Telephone Corporation (2019)

Exhibit 2. Dimension Data journey (1983 to 2020)

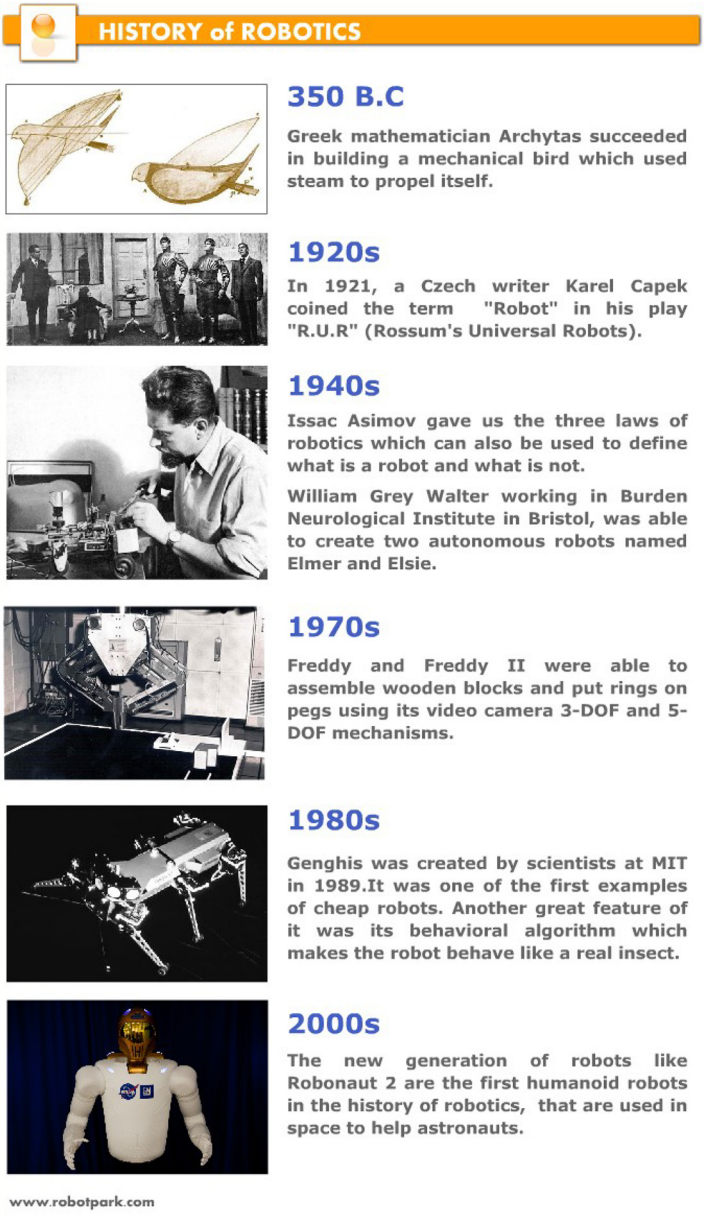
Figure E2



Source: Dimension Data (2020)

Exhibit 3. History of robotics

Figure E3



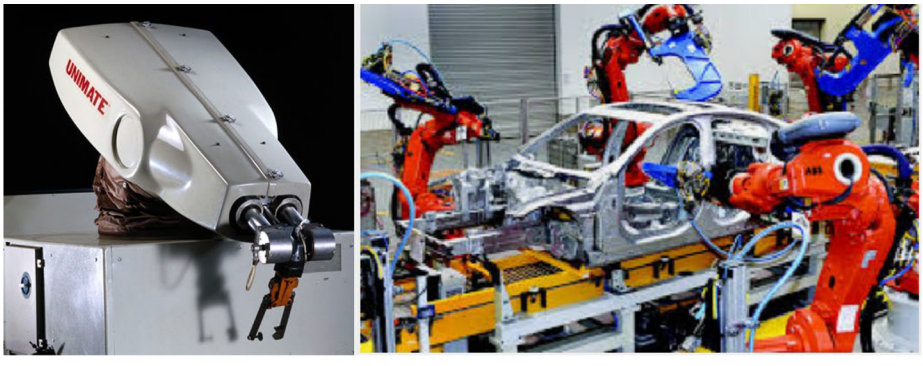
Source: Robotpark.com (2016)

Exhibit 4. Different types of hardware/physical robots

Pre-programmed robots:

- Do simple tasks and have been pre-programmed to work in controlled environment
- Example would be a mechanical arm working in a car manufacturing assembly line

Figure E4

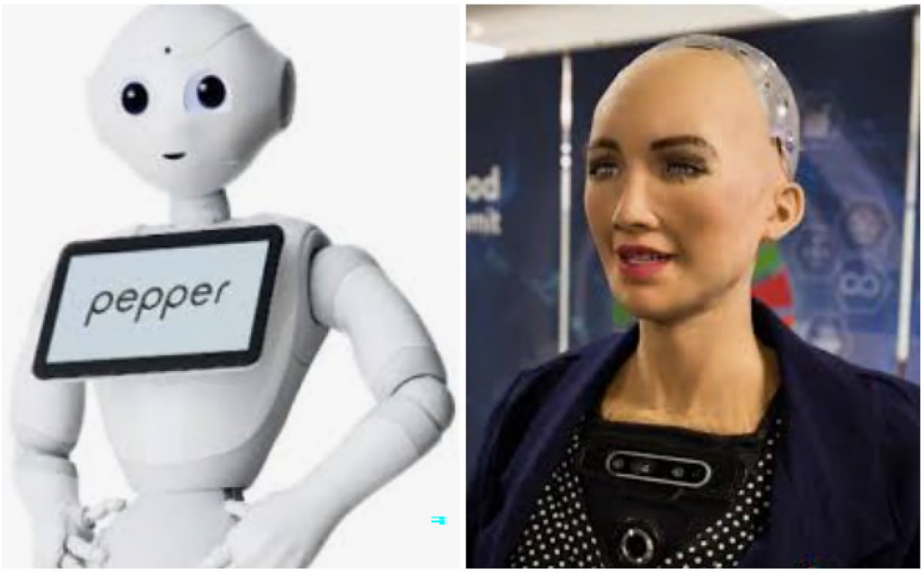


Source: Guizzo (2018); Goyal (2020)

Humanoid robots

- These robots are made to look and behave like humans, with ability to walk, run, carry objects or show facial expressions
- An example of a humanoid robot would be Pepper or Sophia

Figure E5



Source: SoftBank Robotics. (2021); ITU Pictures (2018)

Autonomous robots

- Perform tasks without human supervision, hence acting independently
- An example of an autonomous robot would be Roomba the vacuum cleaner that moves around by using its sensors

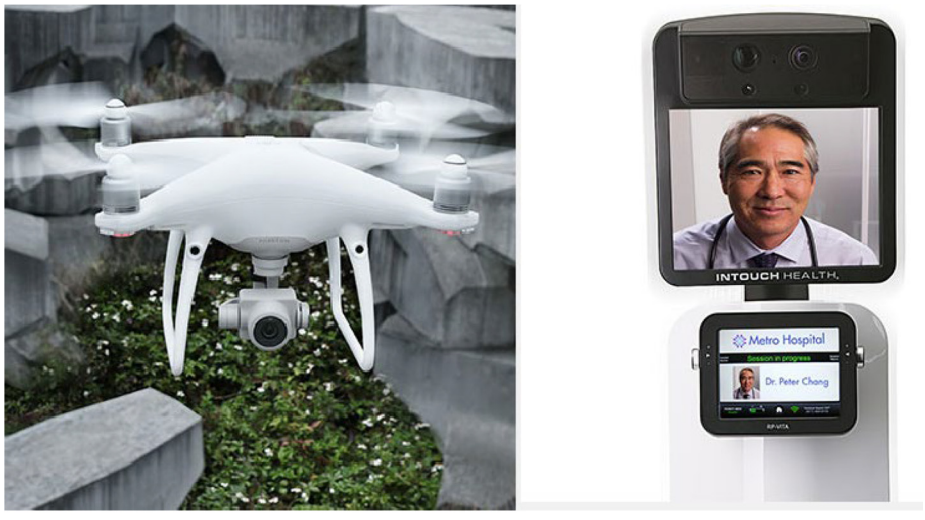
Plate 1

Source: Guizzo (2018)

Teleoperated robots

- These robots are remotely controlled by humans
- An example of a teleoperated robot would be a drone or telepresence robot

Figure E6



Source: https://robots.ieee.org/learn/types-of-robots/; Guizzo (2018)

Augmenting robots

- These robots replace or enhance human capabilities
- An example of an augmenting robot would be a robotic prosthetic limb

Plate 2

Source: https://robots.ieee.org/learn/types-of-robots/; Guizzo (2018)

Exhibit 5. Difference between software and hardware robots

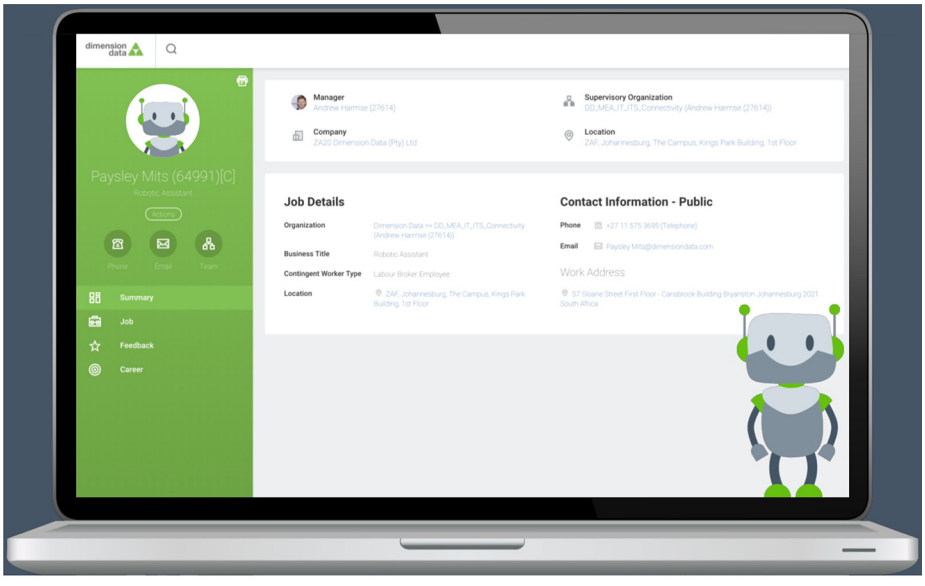
Figure E7

Software Robots	Hardware Robots
Software robots use a blend of automation, **computer perception, and** machine learning **to automate monotonous, high-volume jobs that are custom-focused and trigger-pressed.**	*Hardware robot is a piece of machinery utilizing or implementing automatic power and having different sections each with a specific function and concurrently executing a special task.*
There are many varieties of automation or software robots, varying from the completely standardized to the completely implicit, and the extremely easy to the mind-blowingly complex.	**Hardware robot is a part of engineering which includes various methods** to create, develop, program, and apply robotic machines.
This requires using software to complete tasks which people normally perform when they are utilizing computer programs.	It includes a system of tools that uses the actuator data to perform a particular purpose or output of actions and/or undertaking.
RPA has nothing to do with hardware robots. It applies to "software robots" which are coded to apply for computer programs in the same style as a human operator would. They are simpler to blend into the current business methods.	These comprise computer sensors pretty regularly that monitor the execution of these hardware robots, that can design change in these different engineering systems.
It can be described as an expansion of RPA which utilizes artificial intelligence to determine how humans complete tasks when applying for a computer program. This enables "software robots" to work more effectively.	In this, microprocessors operate by having installed the software developed into them. Without that software, a microprocessor control application will not run.
Software robots can log into applications, transfer files and folders, copy and paste data, edit forms, derive structured and semi-structured information from documents, and more.	**A hardware robot is an appliance working or implementing mechanical energy,** and having different characters, each with a specific function and together doing a special task.
It is all about managing physical methods. It includes managing mechanical devices and control systems to automate jobs in a technical manner. A completely autonomous industry is an advanced example.	*Hardware robots are heterogeneous systems that consist of fundamental components, and devices, control parts, interfaces for beneficial applications, anything from automobiles and airplanes.*
Software robots employ the user interface to catch data and manage applications just like people do.	Robot element companies still need a basic set of policies to support when creating the interfaces of their robot hardware devices.

Source: ByteScout (2020)

Exhibit 6. Paysley Mits, a Dimension Data robotic assistant

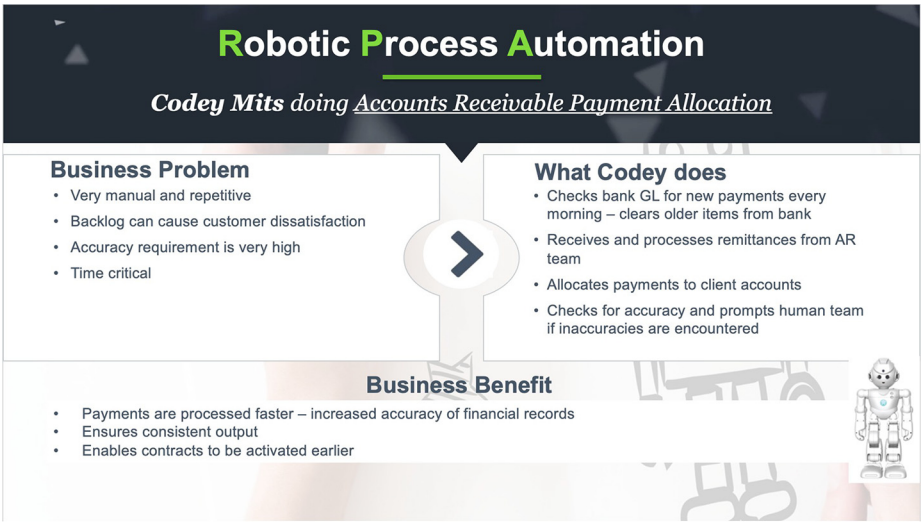
Figure E8



Source: Dimension Data MEA's HR Journey (2019) (https://twitter.com/didatamea/status/1057532776843485186)

Exhibit 7. Codey Mits, a Dimension Data robotic assistant

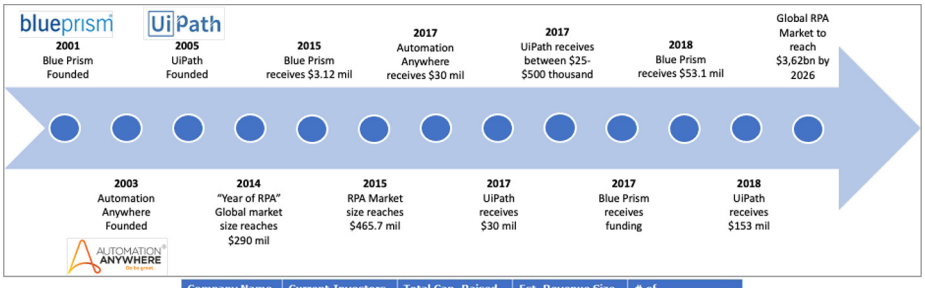
Figure E9



Source: Dimension Data (2016)

Exhibit 8. The RPA landscape

Figure E10

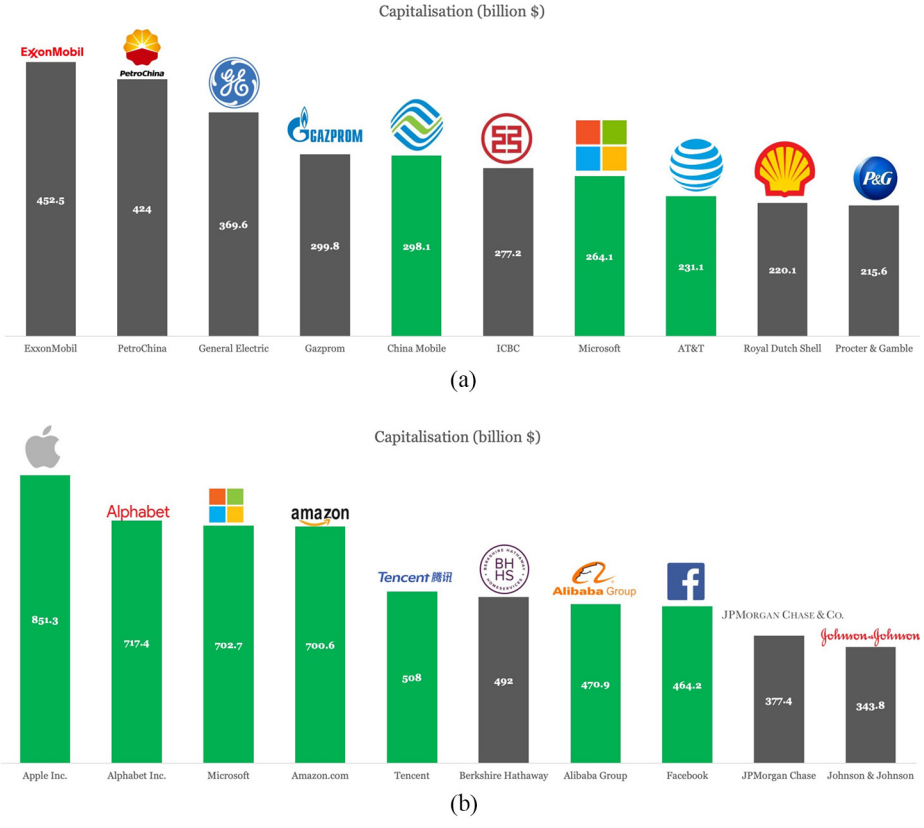


Company Name	Current Investors	Total Cap. Raised ($USD, millions)	Est. Revenue Size	# of Implementation Partners
Blue Prism	Clydesdale Bank, Yorkshire Bank	> $56.2	$38.1	~ 50
UiPath	Seedcamp, Credo Ventures, Earlybird Venture Capital, Kleiner Perkins Caufield & Byers, Accel, Plug and Play Tech Center, and CapitalG	> $183	$43.5	~ 50
Automation Anywhere	Accel	$30	$161	> 100

Source: Siggins (2018)

Exhibit 9. Impact of Digital Disruption over a 10-year period on the Global Top 10 Companies

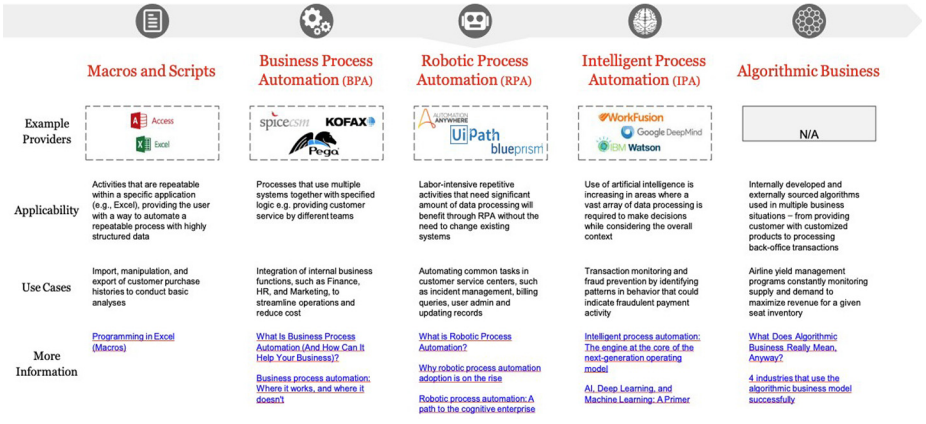
Figure E11



Source: pwC's Global top 100 companies by market capitalisation; Osinubi (2018) pp.3-4

Exhibit 10. The future of RPA

Figure E12



Source: Osinubi (2018) p.15

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