MIS Quarterly Executive

Becoming Strategic with Intelligent Automation

Many intelligent automation programs using robotic process automation (RPA) and cognitive automation (CA) have achieved significant business value. But many others have fallen below expectations. Based on six years of research on hundreds of intelligent automation implementations across geographies, industries and processes, we identified 39 action principles to guide leaders through their intelligent automation journey. But there is plenty more to learn; intelligent automation programs are increasingly becoming integrated with larger digital transformation programs, and many organizations are seeking to automate processes across firm boundaries.[1]

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In 2019, Mary Lacity and Leslie Willcocks received the AIS Outreach Practice Publication Award for their service automation book series.[2] *Based on hundreds of interviews, in-depth case studies, and surveys, these books identified the action principles leading to successful intelligent automation programs that used robotic process automation (RPA) and cognitive automation (CA). Gabe Piccoli, MIS Quarterly Executive Editor-in-Chief, asked Mary and Leslie to discuss their six-year research program, with the goal of consolidating what we know about RPA/CA, and helping identify the remaining challenges for information systems leaders.*

MISQE Research Insights for IT Leaders

Gabe Piccoli: Mary and Leslie, in addition to your books, you have published two case studies on service automation in *MIS Quarterly Executive*, the first of which was an early example of RPA adoption at Telefónica O2, published back in 2016. Two years later, you published a case study of Deakin University's adoption of cognitive automation (CA) technology with Rens Scheepers—I should know, I was the accepting senior editor.[3] Though detailed case studies are useful for our readers, today we are here to reflect on your overall findings and most

1 Gabe Piccoli is the accepting Senior Editor for this MISQE Research Insight. He helped the authors to distill their academic research findings into actionable recommendations for IT leaders.

2 1) Willcocks, L., Hindle, J. and Lacity, M. C. *Becoming Strategic with Robotic Process Automation*, SB Publishing, 2019; 2) Lacity, M. C. and Willcocks, L. *Robotic Process and Cognitive Automation*, SB Publishing, 2018; 3) Lacity, M. C. and Willcocks, L. *Robotic Process Automation and Risk Mitigation: The Definitive Guide*, SB Publishing, 2017; 4) Willcocks, L. and Lacity, M. C. *Service Automation: Robots and the Future of Work*, SB Publishing, 2016..

3 Lacity, M. C. and Willcocks, L. "Robotic Process Automation at Telefónica O2," *MIS Quarterly Executive* (15:1), March 2016, pp. 21-35; Scheepers, R., Lacity, M. C. and Willcocks, L. "Cognitive Automation as Part of Deakin University's Digital Strategy," *MIS Quarterly Executive* (17:2), June 2018, pp. 89-107.

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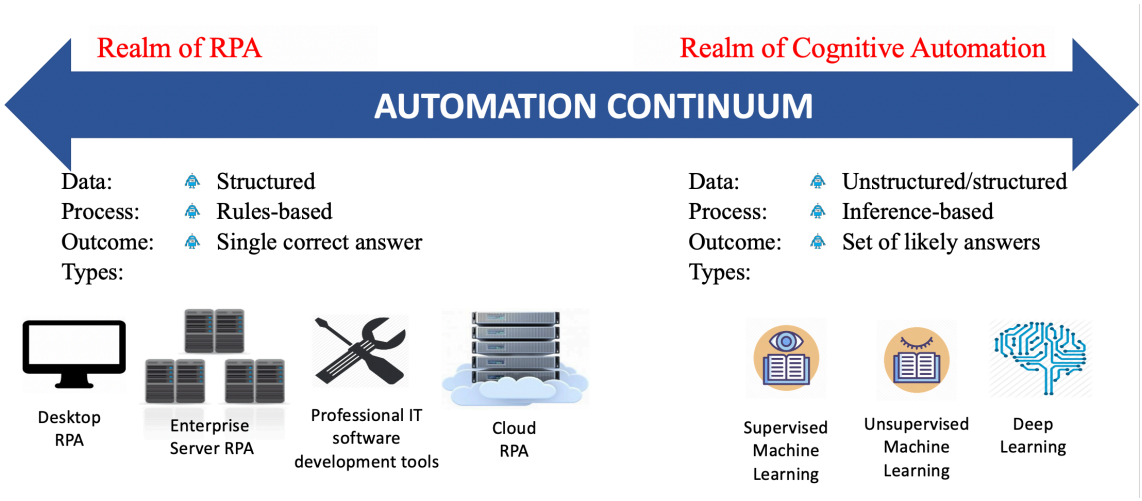
Figure 1: Automation Continuum



impactful lessons from your six-year research program. To help orient the audience, please start by explaining the necessary terminology.

Mary Lacity: We research how enterprises automate services using a variety of digital technologies. When we began studying this space back in 2014, we encountered a dizzying array of automation products marketed as scripting tools, software robots, robotic process automation, artificial intelligence, desktop automation, cognitive computing, business process management automation and machine learning, to name a few. The market was very confusing to practitioners and to us. To make sense of the space, we looked at how these tools worked, the type of data used as input, how they processed data and the type of results produced. Based on this work, we identified a continuum of automation tools (see Figure 1), with the realm of robotic process automation (RPA) at one end and the realm of cognitive automation (CA) at the other. Many commonly call the latter "artificial intelligence" (AI).

The realm of RPA consists of tools that automate tasks that have clearly defined rules for processing structured data to produce deterministic outcomes. For example, a "software robot" can be configured to process tasks the way humans do, by giving it a logon ID, password and playbook for executing processes. RPA tools are ideally suited for automating those mindless "swivel chair" chores performed by humans, like taking structured data from spreadsheets and applying certain rules to update an ERP system. Leslie had the early insight that RPA tools "take the robot out of the human," meaning that the tedious parts of a person's job could be automated, leaving the human to do more interesting work that requires judgment and social skills. His insight resonated so strongly with practitioners, that we had to chase down more than one supplier and conference organizer that had adopted the phrase as their marketing slogan without crediting Leslie. The top RPA providers by market share as of 2020 (and likely in 2021) were Automation Anywhere, Blue Prism and UiPath.

Leslie Willcocks: It is important to note that, because of the consequences for ease of scaling, these software providers do not all provide the same thing. There are variants of RPA ranging from desktop assisted RPA, to enterprise RPA self-development packages, to cloud-based services. The realm of cognitive automation consists of more powerful software suites that automate or augment tasks that do not have clearly defined rules. We do not like to call such software "artificial intelligence" because we believe the AI label overstates what these tools do.

With CA technologies, inference-based algorithms process data to produce probabilistic outcomes. The realm of CA includes a variety

of tools, such as deep learning algorithms and tools that analyze data based on supervised and unsupervised machine learning. Some of the algorithms have been around for decades but the computational power needed to execute them on big data has only recently become available. The input data for CA tools is often unstructured, such as free-form text, either written or spoken. For example, at Deakin University, CA was used to answer natural language inquiries from students. However, the input data can also be highly structured, such as the pixels in an image. Google's Machine Learning Kit, IPsoft's Amelia, IBM's Watson suite and Expert Systems' Cogito are examples of CA tools.

People refer to "strong" AI as using computers to do what human minds can do.[4] The vast majority of organizations are a long way off from that! In our view, however, "AI" is widely and misleadingly used, especially by vendors, as an umbrella term for RPA and CA, as well as for much more advanced software that has not even made it out of the laboratory. The claims by vendors are not helped by the misleading metaphor of comparing the human brain with computing. Most "AI applications" in businesses today can be described as "weak, weak AI"—algorithms driven by massive computing power. This is not "intelligence;" it is machine learning; we call it "statistics on steroids."[5] Though the realm of CA is vast, our research examined how the tools were used to automate or augment back-office processes and customer-facing services, in line with our early interest in RPA. Typical examples we witnessed included processing medical claims, answering customer queries and categorizing user requests to route them to the humans who could help.

Gabe Piccoli: What is the history of RPA/CA technology?

Mary Lacity: Let's begin with a quick history of RPA. In 2012, Phil Fersht, founder of the outsourcing consulting firm Horses for Sources (HfS), used the term RPA in a provocative report entitled Greetings from Robotistan, Outsourcing's Cheapest New Destination. It highlighted a U.K.-based start-up called Blue Prism, which was founded in 2001. Blue Prism did not become well-known until its chief marketing officer, Patrick Geary, started calling its product "robotic process automation" sometime in 2012. That term really resonated with practitioners, so much so that other automation companies started rebranding their tools as RPA. By 2016, there were over two dozen companies saying they provided RPA tools, with a claimed market size of $600 million.[6]

There was a desperate need for RPA standards, so Lee Coulter, then CEO of Ascension Shared Services, started an initiative at IEEE, and in December 2016 became the chair of the IEEE Working Group on Standards in Intelligent Process Automation. The group published the first standard in 2017,[7] which distinguished between enterprise RPA designed for an organization and robotic desktop automation (RDA) designed for a single desktop user. Blue Prism began as an RPA provider; Automation Anywhere began as an RDA provider. Both companies' products have evolved into more sophisticated platforms that include natural language processing and machine-learning features.

Gabe Piccoli: So where does RPA stand today, and what is the market value?

Leslie Willcocks: The RPA market was between $2 billion and $4 billion in 2020, depending on which consulting report you read.[8] Nearly every source predicts that the annual growth rate will be between 30% and 50 %

4 For a more comprehensive coverage of the types of strong and weak AI, see Benbya, H., Davenport, T. H. and Pachidi, S. "Special Issue Editorial: Artificial Intelligence in Organizations: Current State and Future Opportunities," *MIS Quarterly Executive* (19:4), December 2020, pp. ix-xxi.

5 See: 1) Willcocks, L. "Why Misleading Metaphors Are Fooling Managers About the Use of AI," Forbes, April 23, 2020, available at https://www.forbes.com/sites/londonschoolofeconomics/2020/04/23/why-misleading-metaphors-are-fooling-managers-about-the-use-of-ai/?sh=7ec5fec5de1f; and 2) Fersht, P. *Greetings from Robotistan, Outsourcing's Cheapest New Destination*, Horses for Sources, November 1, 2012, available at https://www.horsesforsources.com/robotistan_011112.

6 Fersht, P. and Snowdon, J. *RPA Will Reach $2.3bn Next Year and $4.3bn by 2022... As We Revise Our Forecast Upwards*, November 30, 2018, Horses for Sources, available at https://www.horsesforsources.com/RPA-forecast-2016-2022_120118.

7 *IEEE 2755-2017: IEEE Guide for Terms and Concepts in Intelligent Process Automation*, available at https://standards.ieee.org/standard/2755-2017.html.

8 See: 1) "Robotic Process Automation (RPA) Market Revenues Worldwide from 2017 to 2023," Statista, January 2020, available at https://www.statista.com/statistics/740440/worldwide-robotic-process-automation-market-size/; and 2) Fersht, P. and Snowdon, J. op. cit., November 30, 2018

for the foreseeable future.[9] C-suite priorities for emerging technologies have shifted rapidly because of Covid-19. Though the pandemic prompted many enterprises to postpone horizon technologies like edge computing and blockchains, they became laser focused on technologies that produce rapid returns on investments (ROIs), and the top of that list was process automation.[10]

Gabe Piccoli: Moving to cognitive automation, most *MIS Quarterly Executive* readers are likely familiar with the long history of AI, beginning in the 1940s with the work of Warren McCulloch and Walter Pitts on neural nets, the Turing test and the Dartmouth Conference in 1956, and I am sure we all remember when IBM's Deep Blue beat Gary Kasparov in chess in 1997.

Mary Lacity: Yes, and also Watson's win over Brad Rutter and Ken Jennings in Jeopardy in 2011, and Google DeepMind's AlphaGo victory over Lee Se-dol in 2016.

Gabe Piccoli: This is clearly a booming area of interest. The *MIS Quarterly Executive* special issue in December 2020[11] addressed some of the organizational challenges brought about by AI. Given your focus on service automation, what challenges of CA technologies have you documented in your recent work?

Mary Lacity: Organizations find it difficult to adapt CA tools designed for a specific context like chess, Jeopardy or Go for use in other contexts like processing health records, mortgage applications and calls to helpdesks. Early enterprise adopters experienced painful and expensive implementations, mostly due to the data challenge. Our case companies adopted CA tools with supervised machine learning, which needs thousands of labeled data examples to enable the machine-learning algorithms to reach an acceptable level of proficiency. However, as much as 80% of an organization's data is "dark," meaning that the data is unlocatable, untapped or untagged. Enterprise adopters of CA tools first had to create new data and clean up dirty data that was missing, duplicated, incorrect, inconsistent or outdated. They also struggled with "difficult data," which we define as accurate and valid data that is hard for a machine to read—for example, fuzzy images, unexpected data types and sophisticated natural language text. In our CA cases, much of the work to sort out data problems was done by tedious human review.

But we did find examples of organizations that eventually got value from their CA adoptions, including Deakin University, Zurich Insurance and KPMG. As best practices emerge, more organizations are finding success, though CA implementations still tend to be islands of automation rather than enterprise-wide deployments. The size of the CA market in 2020 is reported to be somewhere between $50 billion and $150 billion.[12]

Gabe Piccoli: So, CA is much bigger than RPA in terms of market size. You mentioned a convergence of RPA and CA. Would you explain that?

Leslie Willcocks: RPA and CA have different histories that are now converging into what practitioners are calling "intelligent automation." The idea of intelligent automation is to institutionalize a well-designed automation program using a platform for pluggable tools that are best-in-class. In our case studies, business value was not derived from the selection of one technology or service provider, but through the ability to identify and connect different technologies that maximize the full potential of modern automation technologies. At present, though, software providers are at different stages in developing automation platforms that can harness both RPA and CA technologies. Some enterprises buy best-in-class tools and use their own platforms to integrate them internally.

Gabe Piccoli: Would you give an example of an integration of RPA and CA?

9 Allied Market Research, reporting on October 13, 2020, forecast that the RPA market at end of 2027 will be $19.53 billion—an annual compound growth rate of 36.4%. A Deloitte survey reporting in December 2020 predicted the RPA market would grow at 40.6% per year to reach $25.6 billion by 2027.

10 See "Enterprise Reboot: Scale Digital Technologies to Grow and Thrive in the New Reality," 2020, KPMG International and HFS Research, available at https://home.kpmg/xx/en/home/insights/2020/08/enterprise-reboot.html.

11 Benbya, H., Davenport, T. H. and Pachidi, S., op. cit., December 2020.

12 See, for example: 1) *Artificial Intelligence Market Size, Share & Trends Analysis Report, Grand View Research by Solution (Hardware, Software, Services)*, by Technology (Deep Learning, Machine Learning), by End Use, by Region, and Segment Forecasts, 2020-2027, July 2020, available at https://www.grandviewresearch.com/industry-analysis/artificial-intelligence-ai-market; and 2) "IDC Forecasts Strong 12.3% Growth for AI Market in 2020 Amidst Challenging Circumstances," IDC, August 2020, available at https://www.idc.com/getdoc.jsp?containerId=prUS46757920.

Mary Lacity: IBM is a good example. IBM's global IT outsourcing services business combined the Blue Prism RPA software with components of IBM's Watson technology. In one service (Global Technology Services Technology, Innovation & Automation), IBM has well over 1,000 customers, and a range of automation tools, including 200 RPA software licenses provided through its London and Amsterdam offices.

One process that IBM automated by integrating technologies was email ticket triage. IBM's customers have email task IDs they can use to send support requests to IBM. The requests are typically things like "Hey, my printer is not working" or "I've forgotten my password." Any emailed support request needs to be logged into the ticketing system and routed to the correct group for resolution. This task used to be done by humans but was taken on in 2017 by an RPA software robot. The robot uses its logon ID to log into the ticketing system. It retrieves an email, logs it into the ticketing system and engages the CA tool, which categorizes the issue as, for example, "this is a network support request" or "this is a telephone request." The CA tool typically has a high degree of certainty, having been trained on thousands of historical tickets. When confidence is low, the ticket is escalated to a human for routing and the label is fed back to the CA tool for learning. The RPA tool closes the loop by identifying the appropriate team and routing the ticket to the correct group.

Leslie Willcocks: That example is just one of many. Increasingly, we see CA tools fed into RPA software, which acts as the execution engine, especially in banking, insurance and financial services organizations. A bank, for example, will have an interactive front-end chat bot for dialogue with customers, but it will draw on RPA to get the information it needs to be able to have a more accurate conversation with the customer, for example, about a stolen credit card. In the future, we will see even better integration of RPA and CA software, leading to automation exchange platforms that are increasingly cloud based. Examples already exist.

Gabe Piccoli: So, we've talked about what these tools are, their histories and how they work, but how do enterprises actually get business value from them?

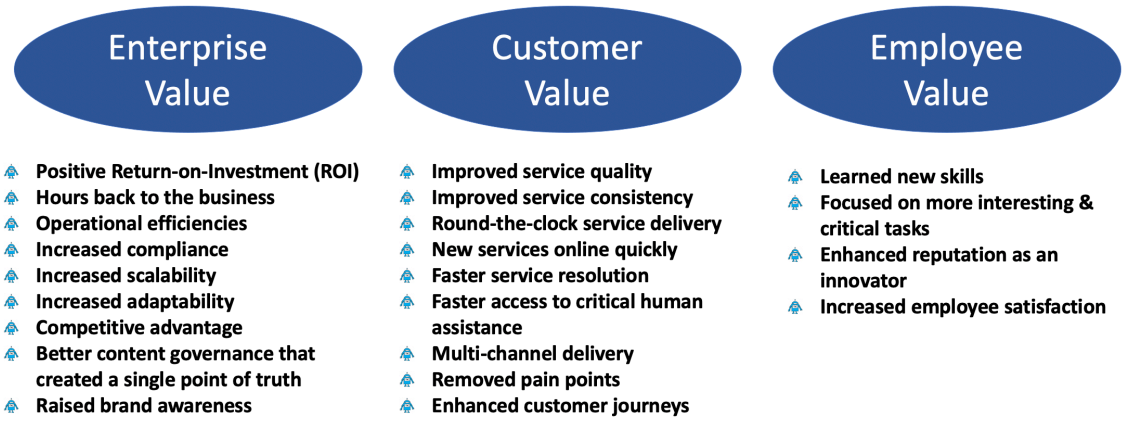
Mary Lacity: We, and others, have studied implementations with outcomes ranging from what we describe as "value triple-wins" to complete failures. We think it's most useful to focus on success stories because practitioners like to learn from, and hopefully mimic, the achievements of early adopters. But we also studied failures so we could identify the action principles that differentiate outcomes.

Many of our case study organizations achieved triple wins by achieving value for three types of stakeholder: the enterprise, customers and—most surprising of all—employees. The Associated Press, BNY Mellon, Bouygues, Deakin University, Ericsson, EY Tax Advisory, KPMG, Mars, Nielsen Holdings, Nokia, nPower, SEC Bank, Shop Direct, Standard Bank, Telefónica O2, the VHA, Xchanging and Zurich Insurance are examples of companies that have achieved at least one source of value from each category. Aggregating these findings, we have listed the specific benefits and sources of enterprise, customer and employee value that RPA and CA have delivered across our case study companies (see Figure 2).

Gabe Piccoli: That list seems a little too good to be true. Can you provide some examples?

Leslie Willcocks: Our two articles published in *MIS Quarterly Executive* provide detailed examples. Keep in mind that we initially studied known successes to see if there was any "there" there! Our Telefónica O2 case identified the value to the company in terms of cost savings, the value to customers, who received faster services, and the value to internal employees, who were released from dreary work to focus on more interesting tasks. The Deakin University case detailed the triple win for three stakeholders: the university raised its global brand awareness, students gained faster access to critical services, and staff members were able to focus on more interesting tasks. Further evidence from other companies can be found in several other

Figure 2: Triple Wins of Service Automation Value Are Evident Across Multiple RPA and CA Implementations



published studies, both by us and by other authors.[13]

Gabe Piccoli: What do failures look like? What were some of the key missteps leaders made early on?

Mary Lacity: We purposefully started researching failures for our second book, *Robotic Process Automation and Risk Mitigation: The Definitive Guide*. It's always hard to find companies willing to talk about their blunders, though there are quite a few accounts of the limitations as well as the benefits of the automation we are describing.[14] The software providers and consulting firms we were working with at the time, including Alsbridge (now part of ISG), Blue Prism, Everest Group, HfS, ISG and KPMG, helped us identify failure cases. We studied many enterprises where RPA implementations failed to deliver value. Problems included: employee sabotage triggered by inappropriate human resource (HR) policies, functional failures due to poor change management, and implementations that irritated, rather than delighted, customers. Some organizations had localized successes with a few projects, but they never succeeded in scaling and maturing the RPA capability across the enterprise.

We identified over 40 risks—which can be considered missteps—in the areas of strategy formulation, sourcing, tool selection, stakeholder buy-in, project management, operations, change management and maturity (see Figure 3).

Gabe Piccoli: Well, that is quite sobering, but also very useful in identifying practices that are responsible for beneficial or poor outcomes. Our readers are most interested in the practices that are unique to this technology. I am sure some of the classic practices leading to successful IT

13 See: 1) Asatiani, A. and Penttinen, E. "Turning Robotic Process Automation into Commercial Success: Case OpusCapita," *Journal of Information Technology Teaching Cases* (6:2), May 2016, pp. 67-74; 2) Davenport, T. H. and Kirby, J. "Just How Smart Are Smart Machines?" *MIT Sloan Management Review* (57:3), March 2016, pp. 21-25; 3) Hallikainen, P., Bekkhus, R. and Pan, S. "How OpusCapita Used Internal RPA Capabilities to Offer Services to Clients," *MIS Quarterly Executive* (17:1), March 2018, pp. 41-52; 4) Lacity, M. C., Willcocks, L. and Craig, A. *Robotic Process Automation at Telefónica O2*, Paper 15/02, The Outsourcing Unit Working Paper Series, April 2015, London School of Economics; 5) Lacity, M. C. and Willcocks, L., "A New Approach to Automating Services," *MIT Sloan Management Review* (58:1), September 2016, pp. 40-49; 6) Lowes, P. and Cannata, F. *Automate This: The Business Leader's Guide to Robotic and Intelligent Automation*, Deloitte, 2017, available at https://www2.deloitte.com/content/dam/Deloitte/us/Documents/process-and-operations/us-sdt-process-automation.pdf; 7) Schatsky, D., Muraskin, C. and Iyengar, K. *Robotic Process Automation: A Path to the Cognitive Enterprise*, Deloitte University Press, 2016; 8) Watson, H. "Preparing For the Cognitive Generation of Decision Support," *MIS Quarterly Executive*, (16:3), September 2017, pp. 153-169; and 9) Willcocks, l., Hindle, J. and Lacity, M. C. *Becoming Strategic with Robotic Process Automation*, SB Publishing, 2019.

14 Examples of successes and failures can be found in: 1) Davenport, T. H. *The AI Advantage: How to Put the Artificial Intelligence Revolution to Work*, The MIT Press, 2018; 2) Smith, R. E. *Rage Inside the Machine, Bloomsbury Business*, 2019; 3) Broussard, M. *Artificial Unintelligence*, The MIT Press, 2018; 4) Smith, G. *The AI Delusion*, Oxford University Press, 2018; and 5) Russell, S. *Human Compatible: AI and the Problem of Control*, Allen Lane, 2019.

Figure 3: Common Missteps Along the Automation Journey

project completion apply (e.g., top management support). Taking those as given, what are the unique practices you found to be critical to RPA/CA success?

Leslie Willcocks: Overall, we identified 39 action principles that were associated with good outcomes (they are listed in the Appendix), one of which is, as you say, Gabe, to "gain C-suite support to legitimate, support and provide adequate resources for the service automation initiative." Many of our action principles commonly apply to any type of organizational adoption of technology, such as getting stakeholder buy-in and following Pareto's rule by automating the smallest percentage of tasks that account for the greatest volume of transactions. We do see value in replicating known practices—they reaffirm what managers already know about successful technology implementations. Managers need to retain many of their practices in the face of a new technology. But our research did reveal provocative findings and new insights.

For example, many people falsely assume the ROI from automation comes from firing employees. While it's true that the primary source of value from service automation is freeing up human labor, the best way to deliver, measure and communicate this value to the enterprise is "hours back to the business." Think of it as a gift given back to the organization. But what will an organization do with that gift? Most enterprises we studied used the freed-up labor capacity to redeploy people to other tasks within the work unit. Many of these organizations were experiencing high growth, and automation helped them take on more work without hiring proportionally more workers. You can easily imagine how valuable it is to grow efficiently by redeploying existing employees rather than searching for, vetting, onboarding and training new ones.

Gabe Piccoli: Can you explain how "hours back to the business" is different from what we normally think of in terms of freeing up full-time equivalents (FTEs)?

Mary Lacity: The two terms are similar, but the messaging is very different. "Hours back to the business" calculations are based on estimating the number of hours it would take if humans still performed the automated tasks. It represents the human capacity that is now free to do different work. Hours back to the business

can be converted to FTEs, typically by dividing by 2,000, the average number of hours an employee works per year. For example, EY's US Tax Advisory Business generated 800,000 hours back to the business within 18 months of its RPA implementation. If EY reported that automation saved them 400 FTEs instead of the equivalent 800,000 hours, many may interpret it as: "We no longer need 400 people." But that sends the wrong message, as the labor savings typically come from automating a portion of people's jobs. In practice, saving 400 FTEs is more likely to come from automating 20% of 2,000 people's jobs.

Gabe Piccoli: But surely some automation implementations lead to layoffs?

Leslie Willcocks: Well, that's where it gets interesting! First, we are talking here about time saved that can be used elsewhere in the organization. Second, the time saved is invariably spread across jobs. It's partial task automation, not job loss. Third, people fail to understand that there is an enormous amount of extra work being generated every year in organizations—in one study we suggest between 8% and 12%.[15] The extra work arises from the exponential explosion in data volumes, increasing audit and regulation requirements, and bureaucracy, as well as the problems that information and communications technologies bring with them—cybersecurity is an obvious example. Increasing workloads allied with skills shortages have forced organizations to turn to automation as a coping mechanism, rather than primarily for headcount reduction.

Of course, we did document some layoffs, but—perhaps surprisingly—layoffs have not been as widespread as one might think, especially during the time frame of our study (2015-2020). Other researchers have also documented this perhaps counterintuitive insight. Davenport and Rananki found that replacing administrative employees was neither a primary objective nor a common outcome of deploying RPA.[16] They found that only 22% of executives sought headcount reduction as the primary objective of "AI." KPMG found that, of the employees displaced by "AI," only 14% were let go, with the rest retrained to deal with data or AI-related tasks, to work on a specific process or in an industry domain, or to service new business needs.[17]

More generally, Manyinka and Burghin, identified three simultaneous "AI" impacts: jobs lost, jobs gained and jobs changed. In their midpoint scenario, jobs lost by 2030 could displace 400 million workers, but these losses would be more than compensated for by the between 555 million and 890 million jobs gained. They also predict that many more jobs would be changed by automation than would be lost.[18]

Mary Lacity. I think it's worth sharing the findings from surveys we conducted with our colleagues John Hindle and Shaji Khan. We carried out two surveys—one in 2017 of 124 senior managers and one in 2018 of 60 service automation adopters. We asked respondents, "What does your organization do with the labor savings generated from automation?" Only 22% of the respondents in the 2017 survey and 15% in the 2018 survey indicated that their organizations laid off employees as a consequence of automation. Other enterprises did reduce headcount, but not through layoffs. Instead, they took a gentler approach to ratcheting down headcount gradually through natural attrition, or by slowing recruitment or offering early retirement.

Our research found that, during 2017 and 2018, service automation technologies were most commonly used to free up employees from dreary and repetitive work, enabling them to focus on more value-adding tasks. Specifically, most enterprises used the freed-up time to redeploy people to other tasks within the work unit or to other work units within the company—for example, to reduce the backlog of work or to take on more work without adding additional

15 See: 1) Willcocks, L. "Robo-Apocalypse Cancelled? Reframing the Automation and Future of Work Debate," *Journal of Information Technology* (35:4), December 2020, pp. 286-302; and 2) Willcocks, L. "Robo-Apocalypse? Response and Outlook on the Post-COVID-19 Future of Work," *Journal of Information Technology* (forthcoming).

16 Davenport, T. H. and Rananki, R. "Artificial Intelligence for The Real World," *Harvard Business Review*, January-February 2018, available at https://hbr.org/2018/01/artificial-intelligence-for-the-real-world.

17 "Easing the Pressure Points: The State of Intelligent Automation," KPMG International (in collaboration with HFS Research), March 2019, available at https://assets.kpmg/content/dam/kpmg/xx/pdf/2019/03/easing-pressure-points-the-state-of-intelligent-automation.pdf.

18 Manyinka, J. and Burghin, J. "The Promise And The Challenge Of The Age Of Artificial Intelligence," McKinsey Global Institute, Executive Briefing, October 2018, available at https://www.mckinsey.com/featured-insights/artificial-intelligence/the-promise-and-challenge-of-the-age-of-artificial-intelligence.

headcount. This was particularly evident in shared service organizations that were under pressure to take on more services without adding additional employees. A lot of these organizations were assigning employees to more customer-facing roles and also combining tasks to redefine what constituted a "job."

In the 2017 and 2018 surveys, respectively, 31% and 43% of respondents had reduced reliance on their service providers. The major IT and business process outsourcing (BPO) providers were well aware that their labor arbitrage business model was severely under threat by automation—they feared losing long-time customers who needed fewer services from outsiders after automation. *MIS Quarterly Executive* published a case study on how one provider, OpusCapita, made the strategic decision to build up a significant RPA capability internally and then extended RPA services to customers.[19] Many other outsourcing providers followed suit.

Gabe Piccoli: Were there other findings of your research that our readers would find surprising?

Leslie Willcocks: Before our field research, we had assumed employees would be threatened by automation. Instead, we found that those who embraced automation[20] developed highly valued skills, and many of them were either promoted or went on to join or start consulting companies.

Mary Lacity: The lesson is that human resources (HR) needs to be involved in RPA/CA automation projects if enterprises want to retain their talent. They need new job descriptions, better compensation packages and opportunities for employees to grow. I believe this is going to be particularly pertinent following the Covid-19 crisis. HR may need to redesign employee scorecards after automation. If they don't, an individual's productivity metric might decline after automation because the employee will focus on more complex work as the robots take over the easy tasks. For example, in one case study on healthcare claims processing, on average, each person processed 12 claims per hour before automation. After automation, this fell to about seven claims per hour—simply because they were now working just on the complex claims. The employees were obviously unhappy because it looked as if their productivity had dropped from 12 claims per hour to seven. The healthcare company understood and adjusted expectations and employee compensation.

Gabe Piccoli: So, your recommendation is to involve HR. This is interesting. What other key advice do you give firms you consult with who are starting or progressing through their RPA/CA journeys?

Leslie Willcocks: For those just starting their journeys, Mary neatly summarizes the action principles with this advice: *think big, start small, institutionalize fast and innovate continually*.

By *thinking big*, we mean that enterprises need to develop an intelligent automation capability to thrive in the 21st century. They need to think strategically about automation from the start by focusing on value triple-wins—for the enterprise, its customers and its employees. Enterprises can *start small* with a pilot, but they likely do not need to do a proof-of-concept; the technology has already been proven, particularly for RPA. A pilot should include a business sponsor, IT security, IT operations, compliance teams and HR so that the automation will be designed for production from the start. There are also plenty of competent advisory firms that can help.

Institutionalize fast refers to creating an organizational structure and change-management capability to mature and scale intelligent automation throughout the enterprise. Many companies set up an RPA/CA center of excellence. Finally, automations need to be managed and continually improved—software robots are like digital employees: they need to be retrained when business rules change and their proficiency can be improved with more feedback.

Mary Lacity: Our advice for progressing an RPA/CA journey is encapsulated in our action principles for running and maturing service automation capabilities (see the Appendix). With six years of research, you can imagine we have a lot to say. But I'll highlight a few critical ones.

19 Hallikainen, P. Bekkhus, R. and Pan, S., op. cit., March 2018; see also Asatiani, A. and Penttinen, E. "Turning Robotic Process Automation into Commercial Success: Case OpusCapita," *Journal of Information Technology Teaching Cases* (6:2), May 2016, pp. 67-74.

20 Many employees so welcomed automation that they anthropomorphized their software robots by providing them with names, personalities and depictions. We first encountered this back in 2014 at Xchanging (now DXC Technologies), and soon found the phenomenon at other sites. For an account, see Lacity, M. C. and Willcocks, L. *What Knowledge Workers Stand to Gain from Automation, Harvard Business Review*, June 19, 2015, available at https://hbr.org/2015/06/what-knowledge-workers-stand-to-gain-from-automation.

Particularly for CA deployments in customer-facing services, initial performance will not be perfect because, as we have already pointed out, CA tools produce probabilistic outcomes rather than deterministic results. No matter how much organizations tested a CA tool in their sandbox environments, it never precisely predicted how customers would actually interact with the technology after it went live. SEB Bank learned to warn customers that a virtual software assistant would make the first attempt at answering their query and provided quick access to a human if they grew frustrated. Initially at the bank, IPsoft's Amelia handled about 50% of text chat conversations without needing human intervention. By continually analyzing the live customer interactions, SEB Bank trained the tool to perform better over time.

Another key piece of advice is to multi-skill the robots. Initially, many organizations were buying one software license—i.e., one software robot per automation process. This meant that several robots would be idle during different times of the working day. Though employees tend to have specialist skills that cannot be dynamically rerouted to balance out demand fluctuations from across the enterprise and also require rest periods, a software robot can be programmed to run different tasks and operate 24 hours a day. It took a while before organizations realized that they could program a single software robot to automate several processes, provided they scheduled them at different times. The RPA providers do not like that insight because it results in fewer software licenses being purchased.

Leslie Willcocks: I can add a bit more to that. Smart organizations are now looking to integrate automation into much bigger digital transformations, and RPA and CA are actually fundamental to such transformations, not a useful "quick-win" appendage. But automation then becomes even more difficult, because digital transformation is a large-scale, long-term, complex process in any sizeable long-standing organization.[21]

Gabe Piccoli: That's interesting, Leslie, because it points to the current challenges. Speaking now to *MIS Quarterly Executive* authors rather than readers, can you expand on what people are struggling with these days? What challenges should authors work to "solve" for IT leaders in this space at this time?

Leslie Willcocks: Yes, we have identified several areas where managers and organizations really need help. The first is that they struggle to scale their automation. By the end of 2019, only 13% had scaled and industrialized their RPA deployment and only 12% had an enterprise approach to automation. We were looking at this again in late 2020, and while the top software providers have lots of customers, very few customers have more than 100 software robots.[22] We think this is partly because the cost of getting to the next stage looks steep, though we have evidence that suggests the benefits can be exponential. Second, there are problems with integrating RPA technology with existing or new IT, let alone across the enterprise. A big issue is preexisting process fragmentation. The challenges of RPA deployment are compounded where C-suite executives do not see these technologies as strategic, stay too remote from the programs or underinvest in automation.

The problems associated with deploying CA technologies are even greater, and each problem is crying out for research attention from a practice-oriented perspective. If you listen to the AI hype, it's very easy to underestimate how slow and challenging progress has been to date. We summarize these challenges with an acronym: BOGSHABIB, which stands for brittle, opaque, greedy, shallow, hackable, amoral, biased, invasive and blurring (fakeable). It's a pretty rich list of things that practitioners need help with, and humans will be vital in not only designing better CA but partnering with technology during operational use.

Interestingly, we have recently seen banks and telecom companies driving digital transformation and automation efforts from different starting points and with different executives. As a result, RPA/CA initiatives can get becalmed. Moreover, slow progress on digital transformation can delay integrating transformation with the automation

21 Wade, M. and Shan, J. "Covid-19 Has Accelerated Digital Transformation, but May Have Made it Harder Not Easier," *MIS Quarterly Executive*, (19:3), September 2020, pp. 213-220

22 In a December 2020 survey by Deloitte of 441 executives, only 13% of organizations had 51 or more robots. See "Automation with Intelligence," Deloitte Insights, 2020, available at https://www2.deloitte.com/content/dam/Deloitte/tw/Documents/strategy/tw-Automation-with-intelligence.pdf.

agenda. Organizational silos slow deployments of RPA, CA and all the digital technologies. We call the extreme version, which we have encountered, "the 8-siloed organization"—i.e., an organization with multiple silos in processes, skills, managerial mindsets, strategy, structure, data, technology and culture. Scaling and optimizing RPA and CA in such organizations, let alone achieving digital transformation, is indeed a long-haul endeavor. A lot of research is still needed in this area.

There has also been little research on "born digital" companies and how they use automation technologies. Have they bypassed the "8-silo" problem, and what can more traditional organizations learn from them? Finally, lots of studies now show that the Covid-19 pandemic and economic crises have accelerated the deployment of automation but, so far, we have found that technologies have been used differently—e.g., to sweat assets or underpin current business performance—or that the crisis might have slowed the automation strategy. Only a few organizations are really investing strategically in automation—maybe as few as 20%.[23] This deserves much more study going forward as we are sure the picture will change dramatically over the next two years. All of this leads to some important research questions:

- How can organizations scale RPA and CA beyond automation islands?
- How can organizations deal with the dramatic skill shifts needed for increasingly digital and virtual businesses enabled by RPA, CA and other automation technologies?
- What human skills are needed in a workforce that will increasingly rely on or work alongside digital workers?
- What role should automation technologies play within broader digital transformation programs?
- What are the critical practices required by digital leaders to ensure strategic automation provides disproportionate business value?
- What emerging technologies will shift innovation priorities for RPA and CA and disrupt workforce and business models even further?
- How can organizational absorptive capacity avoid being outstripped by the pace of technological innovation?

Mary Lacity: To date, intelligent automation tools have been adopted within the boundaries of the firm, but the next phase is happening in cooperation with ecosystem partners. For example, interorganizational data sharing, which requires ecosystem-level solutions, is a great example of the next generation of challenges IT leaders must solve.[24] We are now studying how technologies can automate interorganizational transactions. The solutions often require integrating a variety of technologies, including Internet of Things (IoT), radio frequency identification (RFID), ERP, blockchains, RPA and machine learning. In our recent case studies on ecosystem-level applications, technologies represented between 20% and 30% of the effort required. Up to 80% of the effort was for trading partners to agree on data and event standards, shared governance models, intellectual property rights and compliance assurance. There's a lot more to investigate in this area, including:

- How can service automation technologies be used to automate interorganizational transactions?
- Which governance models are effective for shared applications?

Finally, our research method derived the RPA and CA action principles listed in the Appendix. These principles are based on cumulative evidence thus far, but may need to be revised, extended or retired as organizations gain more experience. We encourage researchers, in particular, to further vet and expand the action principles associated with the maturity phase of adopting intelligent automation.

Gabe Piccoli: Thank you so much for sharing your insights with *MIS Quarterly Executive*. It was very valuable, and quite a bit to take in! Where can readers find out more about your work?

Mary Lacity: Our books, publications, and videos are available at http://www.roboticandcognitiveautomation.co.uk/index.html and at https://blockchain.uark.edu/. Readers are welcome to sign up for our regular newsletters

23 See Willcocks, L. *Global Business: Management*, SB Publishing, 2021.

24 Wixom, B. and Sebastian, I. *Data Sharing across Company Boundaries*, MIT Center for Information Systems Research, 2020, available at https://cisr.mit.edu/content/data-sharing-across-company-boundaries.

and articles from those websites and to connect with us on LinkedIn.

Appendix: Action Principles for Intelligent Automation Adoptions

Action principles are practices identified by our research that produced desirable results in real-world automation implementations. Action principles are grounded in data and are designed to assist other organizations and their digital leaders as they embark on their own implementation journeys. Action principles are similar to best practices in that both seek to share knowledge from prior experiences. But whereas best practices imply that mimicry is always recommended and will always produce similar results, action principles recognize that context matters. The usefulness of an action principle depends on the objectives the organization is trying to achieve, whether the organization has the absorptive capacity to implement the principle effectively. Timing is also important—there are better times than others to apply a specific action principle. We leave it to thoughtful managers to assess the applicability of the action principles to their contexts.

25 The Lewis and Clark Expedition from August 31, 1803 to September 25, 1806 sought to cross the newly acquired western portion of the United States. The expedition leaders had to overcome many new challenges.

The Intelligent Automation Action Principles Identified by Our Research

Strategy
1. You get what you pay for: Focus on long-term value rather than short-term ROI (action) to gain the most value from service automation tools (outcome)
2. Strategy drives investments: Include multiple expected benefits in the justification for service automation investments (action) to achieve the greatest value for the organization, employees and customers (outcome)
3. Consider competitors' reactions (action) to prevent mis-messaging to customers (outcome)
4. Use RPA as forward reconnaissance for CA (action) to gradually build automation skills and to use RPA savings to defer some CA costs (outcome)
5. Strategy envisions longer-term human workforce needs (action) and develops automation and HR plans to gradually meet that vision (outcome)
Sourcing
6. Select the best sourcing option (action) to ensure the success of the implementation (outcome)
7. Incentivize a BPO or tool provider to share the benefits of automation (action) to prevent them from taking all of the savings (outcome)
Program Management
8. Manage RPA as a traditional business case (action) to increase returns on investment (outcome)
9. Manage CA as an innovation program (action) to increase experimentation and to rapidly shift direction (outcome)
10. Manage CA as a learning project (action) to adapt quickly to early lessons learned (outcome)
11. Consider the context (action) to decide which unit is best suited to own the automation program (outcome)
12. Find the "Lewis and Clark"[25] program champions (action) who will overcome obstacles to ensure project implementation (outcome)
Process Selection
13. Take the robot out of the human: Use service automation tools to automate mundane tasks (action) to focus employees on more value-adding work (outcome)
14. Aim for triple wins: Develop comprehensive criteria to identify the best processes to automate (action) to achieve the greatest value for the organization, employees and customers (outcome)
15. Fix discoveries about process flaws before deploying service automation (action) to prevent merely performing a bad process more efficiently (outcome)

(Continued) The Intelligent Automation Action Principles Identified by Our Research

Tool Selection
16. Use a controlled experiment to assess tools (action) to select the tool that delivers the best financial value (outcome)
17. Don't look for a "Swiss Army Knife": Select a tool that does a few things well (action) to ensure technical success (outcome)
18. Negotiate the optimal level of client-provider transparency pertaining to machine-learning algorithms (action) to ensure a good relationship (outcome)
19. Expect technical challenges as a first mover (action) to minimize disappointments (outcome)

Stakeholder Buy-in
20. Manage up: Gain C-suite support (action) to legitimate, support and provide resources for the service automation initiative (outcome)
21. Manage down: Communicate the intended effect on jobs early in the process (action) to obtain employee buy-in and to prevent panic and sabotage (outcome)
22. Report financial savings in terms of "hours back to the business," rather than as FTE savings (action) to reinforce that automation is used to liberate employees from routine tasks (outcome)
23. Manage expectations: Be transparent with customers that they are interacting with automation tools (action) to maintain high ethical standards and acceptance (outcome)

Design, Build and Test
24. Follow Pareto's rule: Automate the small number of tasks that account for the greatest volume of transactions (action) to deliver the most business value (outcome)
25. Don't underestimate the data challenge (action) required to get CA tools to perform competently (outcome)
26. Find new data sources if "dirty" data cannot be cleaned (action) to get the CA tool to perform competently (outcome)
27. Compare training the automation tool to training a new employee (action) so that stakeholders expect the tools to be as competent as new employees and not as competent as experts (outcome)

Run
28. Redesign employee scorecards so that they are credited with productivity gains contributed by their robot teammates (action)
29. Invite customers to experiment with the automated service, but keep other channels open (action) to ensure good customer service (outcome)
30. Invite customers to provide feedback (action) to help improve the performance of a CA tool (outcome)
31. Keep subject matter experts continually engaged in data curation (action) to keep the automation relevant (outcome)
32. Robots need supervisors: Supervise the learning of the service automation tool (action) to prevent machines from making new decisions without human direction and approval (outcome)
33. Rethink human talent and skills (action) needed for long-term success (outcomes)
34. Assign clear roles of responsibility (action) to keep the automation operational and relevant (outcome)

Maturity
35. Reuse components (action) to scale quickly and to reduce development costs (outcomes)
36. Multi-skill the robots (action) to extract more business value (outcome)
37. Create a center of excellence (action) to disseminate automation technologies across the organization (outcome)
38. Integrate RPA and CA initiatives (action) to deliver end-to-end service automation (action)
39. Continually innovate (action) to deliver value to customers, employees and shareholder (outcome)

About the Authors

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Leslie Willcocks (willcockslp@aol.com) has a global reputation for his work in robotic process automation, AI, cognitive automation and the future of work, digital innovation, outsourcing, global management strategy, organizational change, IT management and managing digital business. He is professor emeritus at the London School of Economics, and associate fellow of Green Templeton College, Oxford. He is author or co-author of 71 books, most recently *Global Business: Strategy in Context* (2021), and has published over 240 refereed papers in journals, including *Harvard Business Review*, *Sloan Management Review*, *California Management Review*, *MIS Quarterly* and *Journal of Management Studies*.

