Reshaping the future

Unlocking automation's untapped value

Introduction

Automation is revolutionizing business processes, both customer-facing and back-office. At Amazon Go – Amazon's brick-and-mortar outlets – shoppers can enjoy checkout-free shopping.[1] In Volvo's accounts payables department, 2,000 supplier invoices are automated every day.[2]

Developments in automation technologies – from robotic process automation (RPA) to artificial intelligence (AI) – are transforming operational efficiency, productivity, and creating new revenue and customer experience opportunities. Companies are expected to invest significantly in pursuit of these gains. For example, the market for cubicle artificial intelligence – by which we mean AI for office and administrative, sales, professional, and management jobs – is expected to grow to $48.5 billion by 2021.[3]

But will these and other automation investments deliver a return and are organizations focusing on the automation use cases that offer the most value? To answer this question, we surveyed more than 700 senior executives who are experimenting with or implementing automation solutions. We also analyzed more than 110 real-world use cases, assessing their maturity, complexity, and the benefits that can be gained from them. Drawing on that extensive analysis, this report focuses on three key areas:

- Where organizations are today in terms of their automation maturity and what is holding them back from making more progress
- Where organizations are seeing the greatest benefits in terms of their back-, middle- and front-office operations
- Key recommendations for how organizations can scale their automation efforts, drawing on the best practices of automation leaders.

How do we define automation in our research?

In this study, we define automation as a combination of rule-based and artificial intelligence technologies. It is important to note that the research does not cover mechanical automation (e.g., physical robots used in vehicle production). Rule-based technologies automate high-volume, repeatable tasks and mimic human actions and include both IT process automation (ITPA) and robotic process automation (RPA). Artificial intelligence (AI) encompasses a range of technologies that learn over time as they are exposed to more data. The AI technologies we include in our report are: speech recognition, natural language generation, context-aware computing, biometrics, image and video analysis, machine and deep learning, swarm intelligence, and chatbots or voice bots.

Figure 1. Automation technologies included in our research

Chat Bots and Voice Bots

Speech Recognition

Robotic Process Automation

Natural Language Generation

Context Aware Computing

IT Process Automation

Biometrics

Image and Video Analysis

Machine Learning

Deep Learning

Swarm Intelligence

AI Using Natural Language

AI Using Computer Vision

Rule-Based Automation Technologies

AI Technology Foundations

Source: Capgemini Research Institute

Organizations are only scratching the surface of automation

Few organizations are highly mature in terms of automation:

- Scaled adoption is rare
- Most are focused on operational benefits rather than new revenue opportunities
- Most are focused on rule-based tools with few having progressed to artificial intelligence automation.
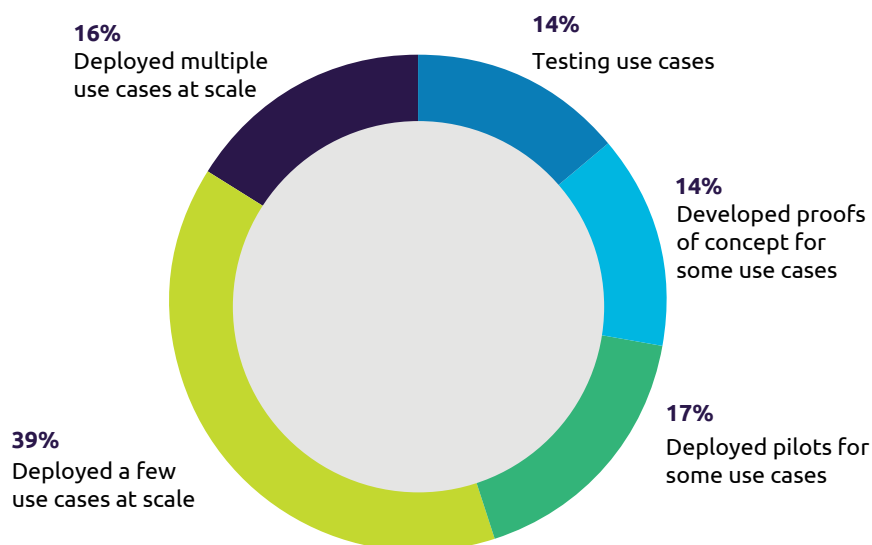
Scaled adoption is rare

As Figure 2 shows, only a minority of organizations (16%) are deploying multiple use cases at scale, by which we mean implementations that go beyond pilot and test projects and are adopted at a larger scale across business units, functions, or geographies. Most are not operating at scale:

- 14% are at proof-of-concept stage, with 17% in the pilot phase
- 39% have deployed a few use cases at scale.

According to Duncan Stott, CIO of Kier Group, a UK construction firm, companies that want to do more need a strong vision. "The tendency [among organizations] is to sit on the fence and do some proofs of concept and a few easy implementations and see what works," he says. "But we need a vision as to what it will ultimately be. CIOs must make a judgement as to what the impact of automation will be." [4]
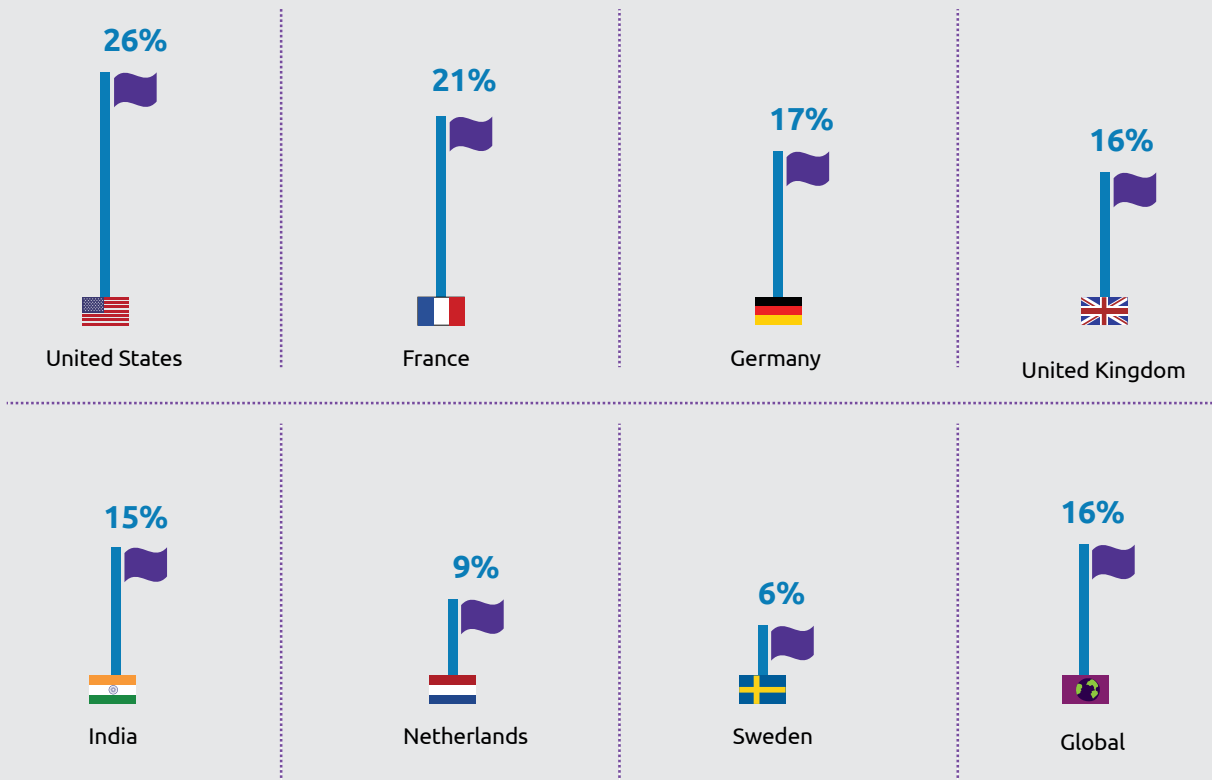

Figure 2. Current level of automation deployment among organizations experimenting with or implementing automation
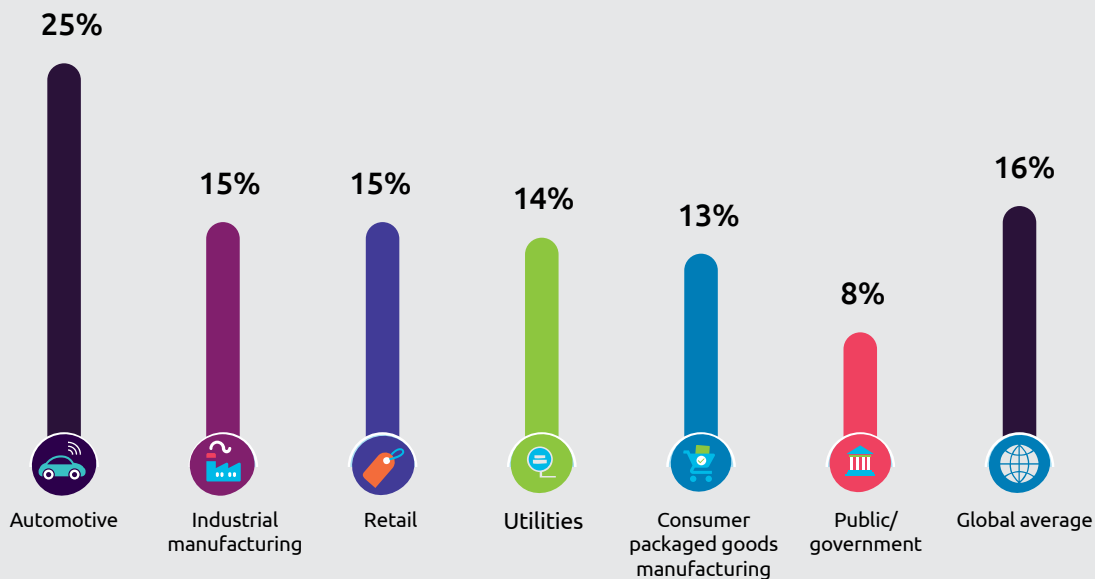

16%
Deployed multiple use cases at scale

14%
Testing use cases

14%
Developed proofs of concept for some use cases

17%
Deployed pilots for some use cases

39%
Deployed a few use cases at scale

Automation maturity:
a national and sector perspective of scale

Proportion of organizations implementing automation at scale by country
(as a percent of organizations experimenting with or implementing automation)

26%	**21%**	**17%**	**16%**
United States	France	Germany	United Kingdom

15%	**9%**	**6%**	**16%**
India	Netherlands	Sweden	Global

Proportion of organizations implementing automation at scale by sector
(as a percent of organizations experimenting with or implementing automation)

25%	**15%**	**15%**	**14%**	**13%**	**8%**	**16%**
Automotive	Industrial manufacturing	Retail	Utilities	Consumer packaged goods manufacturing	Public/ government	Global average

Source: Capgemini Research Institute, Automation Use Case Survey; July 2018, N=705 organizations that are experimenting with or implementing automation initiatives.
*At scale represents deployment of multiple automation use cases at scale, i.e., across multiple processes and across the breadth of the countries the company operates in.
**The financial services sector is not included in the scope of this study owing to our recent research on automation in financial services, "Growth in the machine, how financial services can move intelligent automation from a cost play to a growth strategy."

> "We believe automation will reduce costs by being easy to do business with – we will retain and increase our client base, and therefore, grow our revenue."
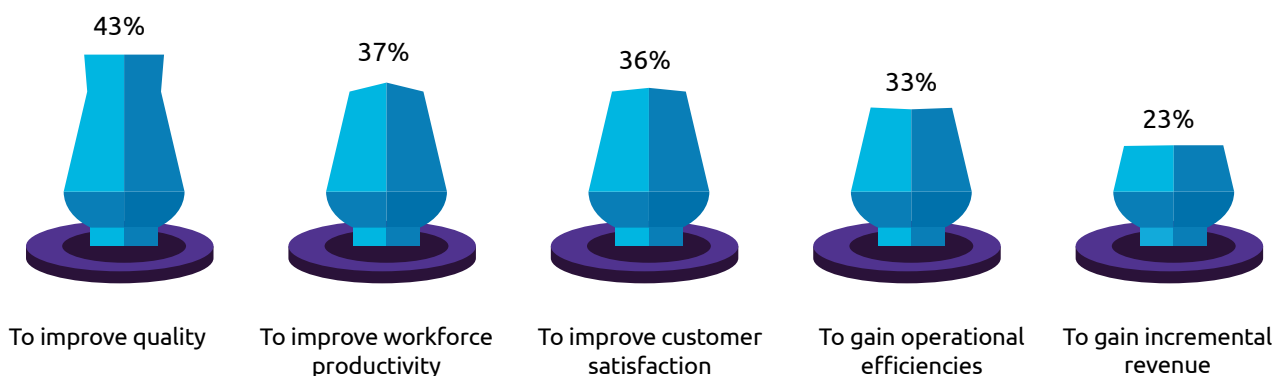
James Robbins
CIO of ArrowXL

Most are focused on operational benefits over topline opportunities

Most organizations are focusing their automation efforts on operational gains or customer satisfaction. In contrast, fewer than a quarter (23%) say their main objective is revenue-focused (see Figure 3). Quality improvement is one of the main drivers behind several process automation initiatives at Procter & Gamble (P&G). One of the company's projects, A/Rex (Accounts Receivable Exponential) automates deductions and claims processing and for 50% of the cases, it can determine with 99.9% accuracy whether the claim is valid or not.[5]

James Robbins, CIO of ArrowXL, a UK home delivery and collection service, sees automation as impacting both top and bottom line. "We believe automation will reduce costs by being easy to do business with – we will retain and increase our client base, and therefore, grow our revenue, so it is top line and bottom line growth," he says.

Other organizations see automation as improving the efficiency of operations. UK-based water retailer, Business Stream, implemented automation to reduce the level of human interaction needed in the repetitive and time-consuming process of customer onboarding. This reduced errors, freed up staff to focus on areas where they can add value for customers and accelerated the time taken to identify and then convert an opportunity.[6]

Figure 3. Main objective behind automation initiatives among organizations experimenting with or implementing automation*

| 43% | 37% | 36% | 33% | 23% |
| To improve quality | To improve workforce productivity | To improve customer satisfaction | To gain operational efficiencies | To gain incremental revenue |

Source: Capgemini Research Institute, Automation Use Case Survey; July 2018, N=705 organizations that are experimenting with or implementing automation initiatives.
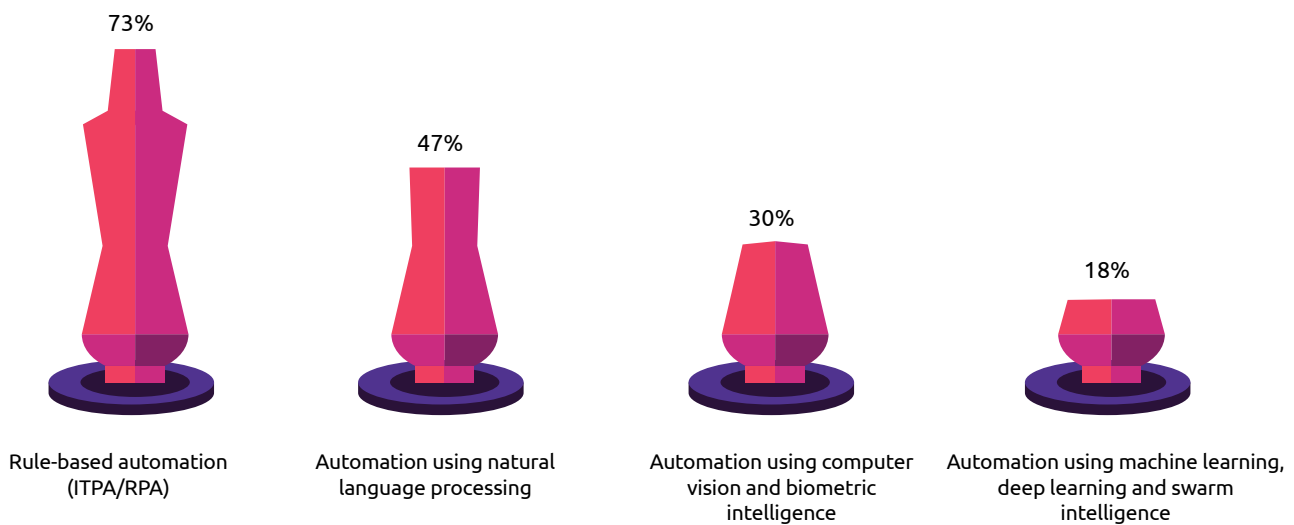*Top two objectives behind launching automation initiatives ranked.

Rule-based technologies dominate over cognitive ones

Today, automation is primarily driven by cost savings and improving operational efficiencies, with a focus on rule-based technologies like ITPA or RPA. We found that 73% of organizations are adopting ITPA or RPA solutions, but only 18% have adopted machine learning technologies (see Figure 4).

Figure 4. Current focus on automation technology among organizations experimenting with or implementing automation

73%
Rule-based automation (ITPA/RPA)

47%
Automation using natural language processing

30%
Automation using computer vision and biometric intelligence

18%
Automation using machine learning, deep learning and swarm intelligence

Source: Capgemini Research Institute, Automation Use Case Survey; July 2018, N=705 organizations that are experimenting with or implementing automation initiatives.
*Question asked was a select all that apply: "Which of the following best describes the technologies your organization uses in its automation initiatives?"
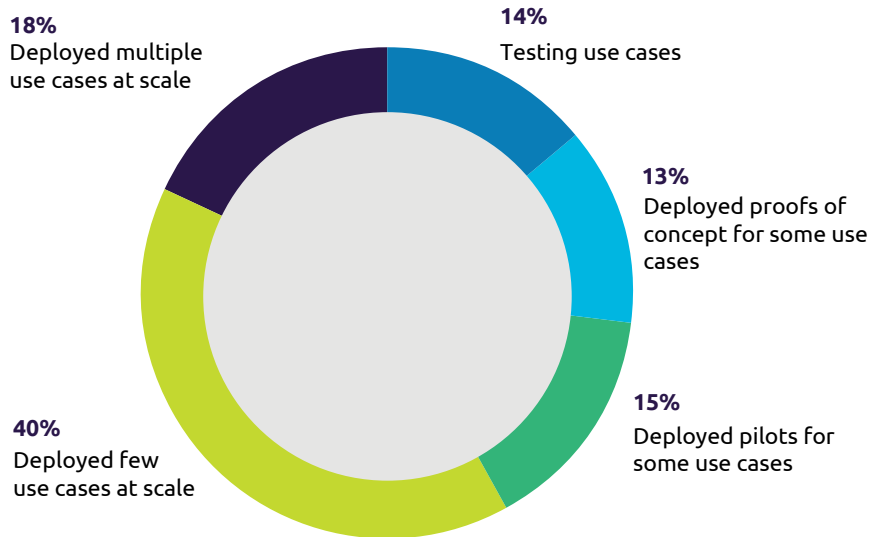
Shop Direct, a UK-based online retailer, has been one of the pioneers in using RPA solutions in its back-office processes. Lindsay Harrison, head of business agility says: "With RPA we have been able to test new ideas fast and without heavy up-front investment. For instance, as a tactical solution we implemented a process to support our credit teams which has now been progressed strategically. This helped to generate revenue and is a great example of business agility." [7]

For many, smart solutions are part of the future, rather than current reality. "At this point, I wish I could say we are using full AI," says the digital transformation leader at a global oil and gas company. "But, currently, our automation is not AI mature. We have plans for it, but we are just collecting the data and we are hoping that in the near future we will use proactive systems."

Even though rule-based automation is most prominent, scaled adoption is still rare. Of those organizations that have deployed rule-based technologies (515 organizations of the 705 we surveyed), only 18% have deployed them at scale (see Figure 5).
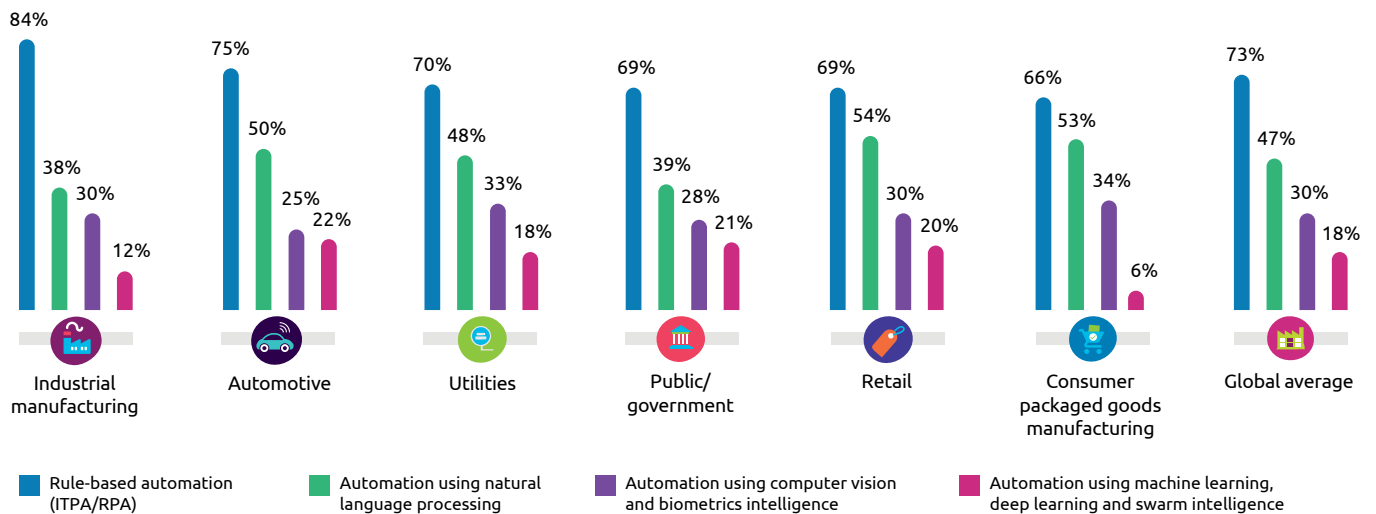
Rule-based technologies are also largely the norm across sectors. As Figure 6 shows, 84% of organizations in the industrial manufacturing sector and 75% in automotive deploy rule-based technologies. In terms of AI technologies, retail is making strong progress, with over 50% using natural language processing. This reflects the sector's focus on AI-driven innovation. Ocado became the first British retailer to launch voice ordering capability on Amazon Alexa in August 2017. Using this Alexa capability, customers can add products to an existing order or get information on recipes.[8]

Figure 5. Maturity of technologies deployed in rule-based automation among organizations experimenting with or implementing rule-based automation

18%
Deployed multiple use cases at scale

14%
Testing use cases

13%
Deployed proofs of concept for some use cases

15%
Deployed pilots for some use cases

40%
Deployed few use cases at scale

Source: Capgemini Research Institute, Automation Use Case Survey; July 2018, N=515 organizations experimenting with or implementing rule-based automation (ITPA/RPA).

Figure 6. Automation technologies deployed by sector among organizations experimenting with or implementing automation

Sector	Rule-based automation (ITPA/RPA)	Automation using natural language processing	Automation using computer vision and biometrics intelligence	Automation using machine learning, deep learning and swarm intelligence
Industrial manufacturing	84%	38%	30%	12%
Automotive	75%	50%	25%	22%
Utilities	70%	48%	33%	18%
Public/government	69%	39%	28%	21%
Retail	69%	54%	30%	20%
Consumer packaged goods manufacturing	66%	53%	34%	6%
Global average	73%	47%	30%	18%

Source: Capgemini Research Institute, Automation Use Case Survey; July 2018, N=705 organizations that are experimenting with or implementing automation initiatives.
*Percentage denotes the percent of organizations in the sector that deploy the specific automation technology.

What are the key challenges that stand in the way of automation progress?
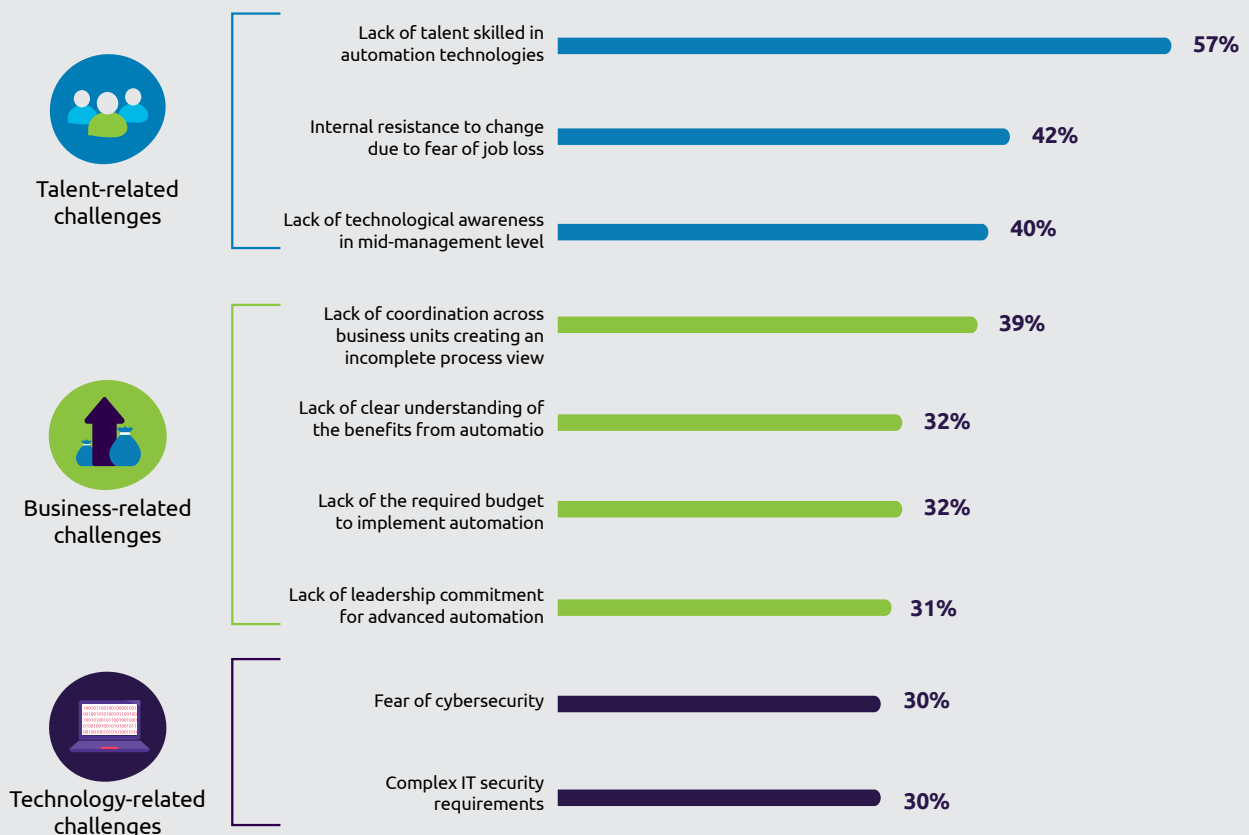
To drive automation at scale, organizations need to overcome a range of business, technology, and talent-related challenges. As Figure 7 shows, talent challenges are a major concern, with the majority (57%) saying that they struggle to find talent with a deep understanding of automation technologies. As the program leader for accounting operations at a leading consumer products goods company says: "To start automation, you need people with some experience. Your process experts know the functional processes, but they aren't trained, or they don't have a mindset, that is more algorithmic in nature."

Organizations also face internal resistance, with 42% saying that their employees are hesitant to embrace automation because of fear of potential job losses. Christian Gottswinter, head of Central Business Excellence at Siemens says: "Employees need the confidence of their job environment to support automation. The adoption of an agile workforce includes eliminating the fear of new technologies. Resilience is a major topic in our VUCA (volatile, uncertain, complex, ambiguous) world and is important to create momentum for digitalization. If an organization doesn't care, you will not be successful. We have to foster an agile and digital culture with open-minded people to drive value in our digital transformation."

Furthermore, well over a third (39%) pointed to the challenge of lack of coordination between business units, which makes gaining a complete view of the process and roles particularly challenging. The head of global operations at a leading industrial manufacturing company warns against the domination of initiatives by one function. "A lot of people see automation as an IT initiative," he says. "But, if the business does not own or drive it, and you let the IT organization on its own drive it, it will fail."

Figure 7. Key challenges in implementing automation among organizations experimenting with or implementing automation*

Talent-related challenges
- Lack of talent skilled in automation technologies — **57%**
- Internal resistance to change due to fear of job loss — **42%**
- Lack of technological awareness in mid-management level — **40%**

Business-related challenges
- Lack of coordination across business units creating an incomplete process view — **39%**
- Lack of clear understanding of the benefits from automatio — **32%**
- Lack of the required budget to implement automation — **32%**
- Lack of leadership commitment for advanced automation — **31%**

Technology-related challenges
- Fear of cybersecurity — **30%**
- Complex IT security requirements — **30%**

Source: Capgemini Research Institute, Automation Use Case Survey; July 2018, N=705 organizations that are experimenting with or implementing automation initiatives.
*Challenges ranked by top three.

56% of organizations have deployed automation in IT and over a third have implemented automation solutions in the middle office

Automation progress is restricted to the back and middle office

In this analysis, we wanted to understand where organizations were focusing implementation efforts and achieving the greatest return, from back office to front office. We define the functions as following:

- The **back office** includes information technology, finance and accounting, human resources, procurement and supply chain, and research and development
- The **middle office** includes customer service, account management, and customer experience
- The **front office** includes sales and marketing.

The back and middle office leads in automation implementation

Within the back office, IT leads the way. As Figure 8 shows, 56% of organizations have deployed automation in IT and over a third (37%) have implemented automation solutions in the middle office. Of the organizations deploying automation in these various functions, approximately 20% do so at scale.

Within **back-office** functions such as IT, the greatest focus is on application diagnostics, application release, and server automation, with rule-based technologies dominating. Of those deploying automation in IT (397 organizations of the 705 we surveyed), 81% are deploying rule-based technologies.

Kadaster, the Dutch land registry and mapping agency, has cut the release cycle time from months to minutes with

Figure 8. Overall* automation implementation by function among organizations experimenting with or implementing automation
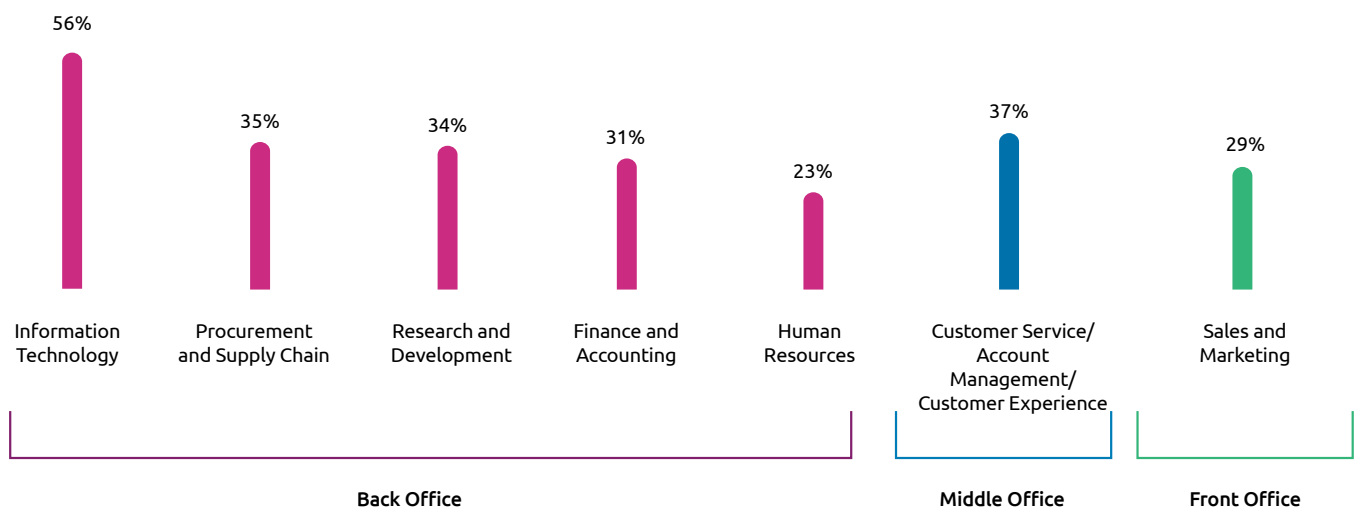
Source: Capgemini Research Institute, Automation Use Case Survey; July 2018, N=705 organizations that are experimenting with or implementing automation initiatives.
*Overall automation includes testing, proofs of concept, pilots, few deployments at scale and multiple deployments at scale.
**Question asked was a select all that apply: "In which of the following functions has your organization implemented automation initiatives?"

IT automation solutions. Charl Vermeer, IT manager for architecture and innovation at Kadaster says: "Automation technology has been a key enabler for our transformation into an agile DevOps organization. Release cycle times went from 6–9 months to minutes. The zero-maintenance systems management is fully automated. This has not only resulted in a higher availability of key production applications and improved application quality, but also in an enhanced end-user experience and satisfaction."[9]

Within the **middle office,** the major focus is on areas such as order validation and customer satisfaction tracking. In the middle office too, rule-based technologies dominate, with 79% of those deploying automation in the middle office (264 organizations of the 705 we surveyed), implementing rule-based technologies.

"We had deployed automation in our contact centers," says James Robbins of ArrowXL. "In the same month, our abandoned call rate went down from 20% to 10% and this was because the team was more available to answer calls as well as to do outbound." UK-based United Utilities has invested £250,000 in 10 software robots that monitor signals and alerts from the water network and automatically inform engineers to issues so they can locate and fix them before they affect customers.[10]

Within the **front office**, the areas where sales and marketing automation is most commonly implemented include processes, such as customer data processing (mostly RPA) and chatbots (driven by natural language technologies). As is the case in the back and middle office, the majority (81%) of organizations that have deployed automation in sales and marketing (203 organizations of the 705 we surveyed) have

used rule-based technologies. This might signify that there is a focus on simplifying operational processes supporting sales executives' day-to-day work as the technology director within accounting and control at a large automaker believes. He says: "For sales, automation is a lot about the back-office administration connected to sales like managing sales orders, products and materials. I think there are several administrative processes in sales – invoicing, for example, where there is a lot of potential for automation."

Chatbots and voice bots are also making headway in the front office, with 57% deploying natural language processing in sales and marketing. According to the head of global operations at a leading industrial manufacturing company, AI is where the greatest opportunity lies. "From a sales perspective and from a market perspective, we are looking more into artificial intelligence as we see the greatest potential value there." he says.
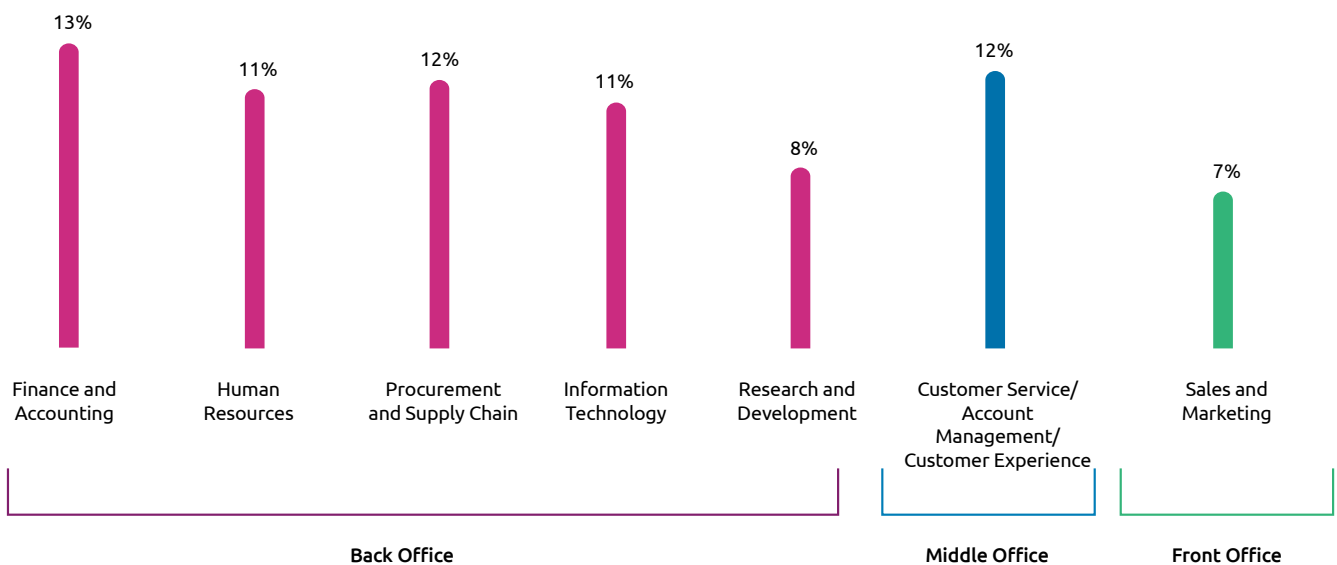
RedBalloon, an Australian online gift retailer, is using an AI-powered digital marketing platform to process the large database of customer interactions and transaction history. With the help of AI, the company was able to reduce the total cost of acquisition by 25% in one month. The time spent by the marketing team on manually executing search campaigns or altering social media audiences was redirected to more strategic activities, such as devising campaigns that targeted niche and high-value audiences uncovered by AI.[11]

Back- and middle-office functions realize the greatest automation benefits

Organizations consider various operational metrics to measure the success of automation such as time saving, productivity enhancement, and improved accuracy, which broadly fall under cost efficiencies.

The back and middle offices realize greater benefits from automation compared to the front. Among organizations implementing automation at scale, back-office functions, such as finance and accounting, drives cost savings of 13% compared to 7% in the front office (see Figure 9). Lee Edwards, IT director of the UK's NHS Shared Business Services, highlights the role of automation technologies in meeting back-office operational productivity objectives. He says: "RPA will bring significant efficiencies to our back-office functions and help improve customer services through improved speed and accuracy of processing."[12]

Figure 9. Average cost savings by function for those organizations implementing automation at scale

13%	11%	12%	11%	8%	12%	7%
Finance and Accounting	Human Resources	Procurement and Supply Chain	Information Technology	Research and Development	Customer Service/ Account Management/ Customer Experience	Sales and Marketing
Back Office					Middle Office	Front Office

Source: Capgemini Research Institute, Automation Use Case Survey; July 2018, N=111 organizations implementing automation at scale.

The back-office functions of procurement and supply chain and human resources realize, on average, the greatest return on investment (ROI) at 18% and 15%, respectively. Research and development and customer service take the shortest time to recoup their investment at 7.3 and 9.1 months, respectively (see Figure 10).

Figure 10. Average return on investment and payback period by function for those organizations implementing automation at scale
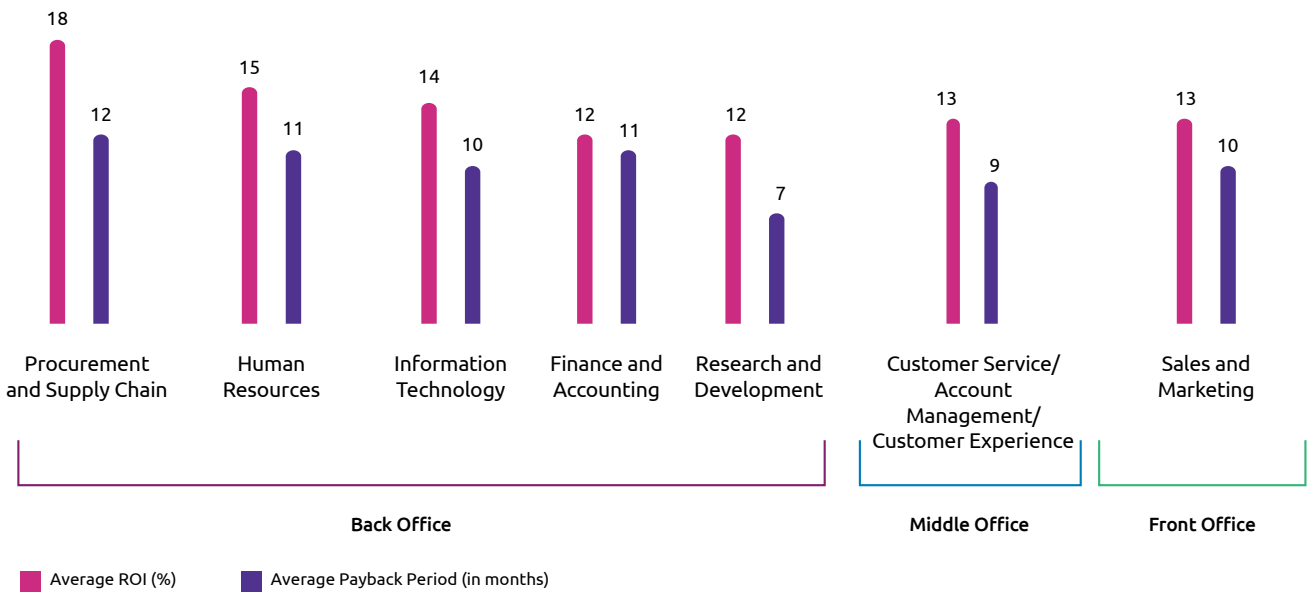
Source: Capgemini Research Institute, Automation Use Case Survey; July 2018, N=111 organizations implementing automation at scale.

Among organizations implementing automation at scale, finance and accounting drives average cost savings of **13%** compared to **7%** in sales and marketing

Automating at scale can drive significant cost efficiencies across sectors

We sought to demonstrate the cost saving benefits that automation can deliver. We built a model starting with the global automotive sector since it has been a pioneer in automation and has the highest penetration of automation at scale among all sectors in our research. We then conducted the same analysis for the other sectors in our research. Building on the results of our survey data, we found that the automotive sector could realize cost savings of over $32 billion by 2022 if it were to implement automation at scale in its target processes, representing an increase of 106% from 2017 (see Figure 11).

Figure 11. Cost savings of $32 billion to $165 billion could be realized across sectors by implementing automation at scale[1]

A. Total forecasted revenue for global automotive manufacturers, 2022 (in billions)[2] $3,848.4

	B. Operating cost as a % of revenue for the automotive sector (benchmark data)	C. Operating cost in billions for the automotive sector (A*B)	D. Target proportion of processes to be automated (survey data)	E. Operating costs of automated processes[3] (D*C)	F. Average cost savings from automation at scale in automotive (survey data)	G. Average cost savings in billions from automation at scale for the automotive sector (E*F)
Procurement, Manufacturing (excluding direct material, overhead) and Supply Chain	6.1%	$235.4	26.3%	$61.9	12.6%	$7.80
Sales and Marketing	12.3%	$472.9	32.1%	$151.9	6.6%	$9.96
Customer Service	3.6%	$139.8	29.3%	$40.9	13.5%	$5.51
Research and Development	2.9%	$110.9	19.4%	$21.6	10.6%	$2.28
Information Technology	2.9%	$113.4	32.5%	$36.9	11.5%	$4.24
Finance and Accounting	1.0%	$36.6	29.4%	$10.8	13.7%	$1.48
Human Resources	0.4%	$13.5	31.3%	$4.2	9.4%	$0.39
Total projected cost savings over the next five years in the automotive sector (in billions)						**$31.7**
Total cost savings today in the automotive sector (in billions)						**$15.4**
Percentage increase in cost savings by 2022 in the automotive sector						**106%**

Up to $471 billion
Cost savings by 2022 through wide-scale adoption of automation across the automotive, retail, utilities and manufacturing sectors

We conducted the same analysis for the retail, utilities and manufacturing sectors. Our analysis found that:

- The retail sector could realize cost savings of **$125 billion** over the next five years (representing an increase of 130% from 2017 to 2022)

- The utilities sector could realize cost savings of **$149 billion** over the next five years (representing an increase of 165% from 2017 to 2022)
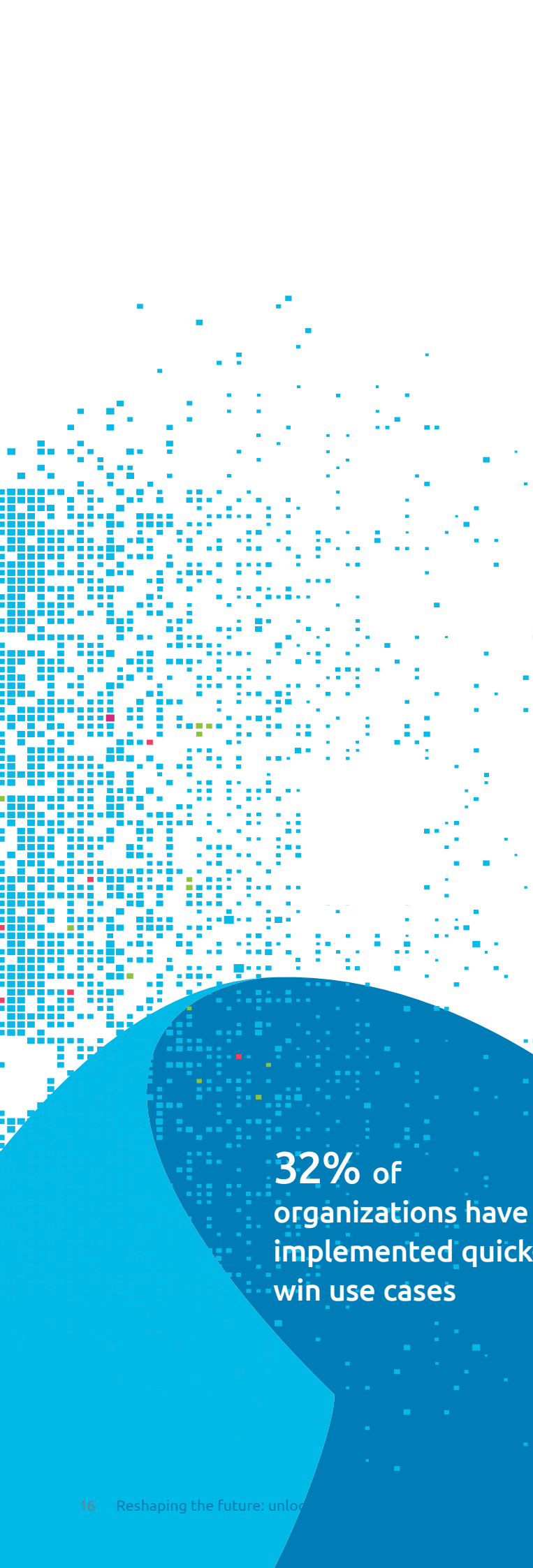
- The manufacturing sector (including consumer packaged goods and industrial) could realize cost savings of **$165 billion** over the next five years (representing an increase of 132% from 2017 to 2022).

Many organizations are missing a sizeable quick-win opportunity

As organizations look to drive benefits, this analysis also examines which use cases they are focusing on. We looked at 64 use cases across seven functions and segmented them on two dimensions: complexity of implementation and benefit realized. As Figure 12 shows, only around a third (32%) have implemented "quick wins" – those use cases that are not only easy to implement but also have a high benefit upside. In contrast, over a third (36%) have implemented "case-by-case" use cases, which are difficult to implement and do not necessarily deliver a huge return. There may be a perception that if a use case is complex to implement, it must deliver great benefits, regardless of whether this is the case or not.

32% of organizations have implemented quick-win use cases

Figure 12. Distribution of use cases by complexity of implementation and benefit realized across functions and sectors

The percent distribution in each quadrant indicates the percentage of organizations deploying few or multiple use cases at scale among the total number of organizations deploying those use cases (e.g., 32% of organizations deploying use cases termed "quick wins" are either deploying few or multiple use cases at scale).

Low Complexity

Fill-ins — **34%**

- Customer data processing
- CRM updation
- Personalized marketing
- Employee data management
- Creating and delivering invoices
- Online self service - quote generation
- Advertisement spend management
- Automated marketing campaigns
- Defect detection
- Contract management
- Submitting data to regulators
- Updating inventory records
- Chatbots for sales

Quick Wins — **32%**

- Lead generation
- Fixed asset accounting
- Education and training
- HR compliance and reporting
- Exit and clearance
- Performance management
- Invoice processing
- Payroll management/validation
- RFP generation
- Absence management
- PO processing
- Onboarding
- Pricing calculations
- Applicant sourcing/recruitment
- Responding to customer/ supplier requests
- Reconciliation
- Order entry
- Updating vendor records
- Time and attendance management
- Advance shipping notices
- Employee service management
- Accounts receivable and cash management

Case-by-Case — **36%**

- Application release
- Intelligent cybersecurity monitoring
- Design optimization
- Monitoring protocols compliance
- Entering data into statistical databases
- Checking data quality
- Predictive maintenance
- Storage automation
- Application diagnostics

Plan and Strategize — **37%**

- Autonomous self heal systems
- Demand/supply planning
- Order waves planning, shipment paperwork, routing
- Pre-populate order data on agent screens
- AI based event correlation
- Financial planning and analysis
- Customer credit check
- Customer data management
- Travel and expense reporting
- Order validation with inventory available
- Chatbots for customer service
- Real time conversation analysis
- Baseline security activities
- Quality feedback loop
- General Ledger and reporting
- Accounts payable and expense reporting
- Customer satisfaction tracking
- Server automation
- Query prioritization and resolution
- Customer credit check

Complexity of Implementation (vertical axis, Low Complexity to High Complexity)

Benefits Realized (horizontal axis, Low Benefit to High Benefit)

Legend:
- Human Resources
- Finance and Accounting
- Procurement and Supply Chain
- Information Technology
- Research and Development
- Customer Service
- Sales and Marketing

Source: Capgemini Research Institute, Automation Use Case Survey; July 2018, N=705 organizations that are experimenting with or implementing automation initiatives.

Quick wins by function

Figure 13. Low-complexity and high-benefit use cases by function

Finance and accounting

- Accounts receivable and cash management
- Reconciliation
- Fixed asset accounting
- Order entry
- Pricing calculations

Accounts receivable and cash management

At NBCUniversal, most of the robots in finance are deployed in cash applications and invoice creation for international order to cash. Bob Kurpershoek, Director of Finance at NBCUniversal says: "The volume is high, and process is quite standardized. A combination of these two make the return on investment of putting a robot in place very positive." [13]

Procurement and supply chain

- Updating vendor records
- Invoice processing
- PO processing
- Responding to customer/ supplier requests
- RFP generation
- Advance shipping notices

Invoice processing

Coca Cola Philippines has automated its incoming invoices, where invoices are automatically captured and sorted according to pre-specified rules set by the internal policy. Relevant information is extracted and matched to purchase order and goods receipt. A verified invoice is automatically posted for payment and exceptions are routed to a workflow where assigned personnel are alerted to take actions on flagged entries. [14]

Human resources

- Onboarding
- Exit and clearance
- Payroll management/ validation
- Applicant sourcing/recruitment
- Absence management
- Time and attendance management
- HR compliance and reporting
- Performance management
- Education and training
- Employee service management

Recruitment

PepsiCo is using pioneering robotic software to interview and screen candidates for jobs, including forklift truck drivers and factory workers in Europe.[15]

Absence Management

Overstock, an online retailer, has deployed an HR chatbot called Mila that manages employees calling in sick and alerts their managers.[16]

Onboarding

Steinhafels Inc., a furniture retailer based in the midwest US, standardized its process for employee onboarding through automation. [17]

Sales and marketing

- Lead generation

Lead generation

Harley-Davidson used artificial intelligence to increase New York sales leads by 2,930%. The AI tool used highly targeted marketing activities to identify customers who shared the attributes of previous high-value customers.[18]

Source: Capgemini Research Institute.

Quick wins by sector

Retail

Advertising spend management I Lead generation I Chatbot/conversational agent for sales

Chatbots for self service

H&M's chatbot helps mobile customers navigate their search, guiding them to outfit possibilities and helping them find the store "area" that aligns with their purchase needs.[19]

Reconciliation

Updating vendor record I Invoice processing/matching I RFP generation I Warehousing - plan/prioritize order waves, shipment paperwork processing, routing

Warehousing

AS Watson, the largest international health and beauty retailer in Asia and Europe, is exploring machine learning possibilities for accurate demand management and sales forecasting.[20]

Onboarding I Exit and clearance I Payroll management/validation I Applicant sourcing/recruitment I Absence management I HR compliance and reporting I Performance management I Employee service management

Recruitment

Tesco's pre-hiring automation includes quizzes, psychometric tests, games, and chatbots that can reject applicants before a human ever glances at their resume.[21]

Automotive

Creating and delivering invoices I Advertisement spend management I Lead generation I Personalized marketing

Advertising spend management

Volkswagen uses AI and predictive analytics to forecast advertising spend decisions. Between September and December 2016, Volkswagen used the algorithm's media recommendations in a campaign, which led to a 14% increase in dealership orders.[22]

Personalized marketing

For its RAV4 model, Toyota launched a highly targeted digital campaign using algorithms to generate ad scripts. In partnership with their advertising agency, Toyota created 300 unique videos and used Facebook's behavioral data to deliver hyper-relevant content that was personalized to each customer's interests.[23]

Fixed asset accounting

Updating vendor records

Customer data processing I Customer satisfaction tracking I Chatbots/conversational agent for self-service

Onboarding I Payroll management/validation I Applicant sourcing/recruitment I Education and training

■ Sales and Marketing	■ Human Resources	■ Information Technology
■ Finance and Accounting	■ Customer Service	■ Research and Development
■ Procurement and Supply Chain	■ Cross Functional	■ Industry specific applications

Consumer Packaged Goods Manufacturing

Application diagnostics

Travel and expense reporting

Contract management | RFP generation | Logistics – track and trace, customs forms

Logistics

CPG companies, such as PepsiCo, Dannon, and Anheuser-Busch, use AI-powered inventory software to maximize supply chain efficiency and provide business insights to sales representatives.[24]

Quality Feedback Loop | Chatbots/ Conversational agent for self service

Chatbots

L'Oreal has entered the Facebook messenger chatbot trend with an AI-driven gifting service in Canada. The Messenger bot asks users questions about their friends and then suggests the right beauty gifts.[25]

Periodic report preparation and dissemination

Hazard management and surveillance | Removing production line defects | Predictive maintenance

Public Sector

Online self-service tools

General Ledger (GL) and reporting | Financial planning and analysis | Fixed asset accounting | Customer credit check | Pricing calculations

Back-office functions

The UK Cabinet Office is aiming to accelerate the take-up of robotic process automation (RPA) in government and is developing an RPA CoE. Chris Hall, deputy chief commercial officer, UK Cabinet Office says: "RPA is an excellent opportunity for public sector organizations to realize significant productivity gains and focus on more value-added services." [26]

Onboarding | Absence management | HR compliance and reporting | Employee service management

Periodic report preparation and dissemination | Generating mass emails

Incident reporting | Case management | Tax calculations | Anti-fraud checks | License/permit applications processing | Passport renewal

Anti-fraud checks

US tax agency, the IRS, is exploring the potential of artificial intelligence and machine-based analytical platforms to proactively detect and respond to cyber- and insider-related threats.[27] The agency is also looking to expand automation into business practices, such as identity, refunds, and fraud.[28]

Sales and Marketing	Human Resources	Information Technology
Finance and Accounting	Customer Service	Research and Development
Procurement and Supply Chain	Cross Functional	Industry specific applications

Industrial Manufacturing

Application release automation I Autonomous self-heal systems

Accounts receivable and cash management I Accounts payable and expense reporting I Reconciliation I Customer credit check I Pricing calculations

Accounts receivable and accounts payable

GE Global Operations have deployed RPA bots in processes such as matching order numbers in incoming invoices to those recorded in GE's system, monitoring payment deadlines, recording receivables, managing warranties, and checking the payment exchange rates of international financial transactions.[30]

Responding to customer/ supplier requests

Periodic report preparation and dissemination

Bills of material generation I Hazard management and surveillance I Removing production line defects I New products development I Predictive maintenance I Smart homes and appliances

Predictive maintenance

Boeing predicts when a part needs maintenance, repair, or replacement by utilizing artificial intelligence and machine learning, and deciphering usage patterns such as flight conditions, location, temperature, altitude, wind speed and direction.[29]

Utilities

Intelligent cybersecurity monitoring

Accounts receivable and cash management I Reconciliation I Fixed asset accounting I Order entry

Invoice processing/matching

Customer data management/ processing I Customer credit check

Customer data processing

Duke Energy, one of the largest electric power holding companies in the US, uses RPA solutions to process customer requests around the clock, immediately sending confirmations to customers who are assured their requests are received and their services scheduled.[31]

Onboarding I HR compliance and reporting I Performance management I Employee service management

Periodic report preparation and dissemination

Pricing/billing

Billing

An early adopter of robotic process automation, UK-based utility "npower" has been automating areas such as meter management, customer billing, exceptions processing, and managing energy consumption and supply.[32]

■ Sales and Marketing	■ Human Resources	■ Information Technology
■ Finance and Accounting	■ Customer Service	■ Research and Development
■ Procurement and Supply Chain	■ Cross Functional	■ Industry specific applications

Source: Capgemini Research Institute.

Who are the automation leaders and what do they do differently?

To understand the traits of organizations that have successfully scaled automation efforts while also delivering significant benefits, we identified a group of what we call "automation leaders." These high performers, who make up 10% of our sample, have deployed multiple use cases at scale and delivered greater cost and revenue benefits than average.

Leaders have a clear automation transformation strategy and roadmap

We have a roadmap to transformation through automation

68% leaders

vs.

58% all other organizations

We have the necessary budget for implementing automation initiatives

67% leaders

vs.

56% all other organizations

Leaders ensure their organization and leadership are bought in

Automation is a high priority in my organization

85% leaders

vs.

73% all other organizations

Our leadership understands the importance of automation

82% leaders

vs.

67% all other organizations

Leaders focus on people and skills development

Automation initiatives are welcomed by our employees

88% leaders

vs.

71% all other organizations

Automation is creating new job roles within our organization

83% leaders

vs.

69% all other organizations

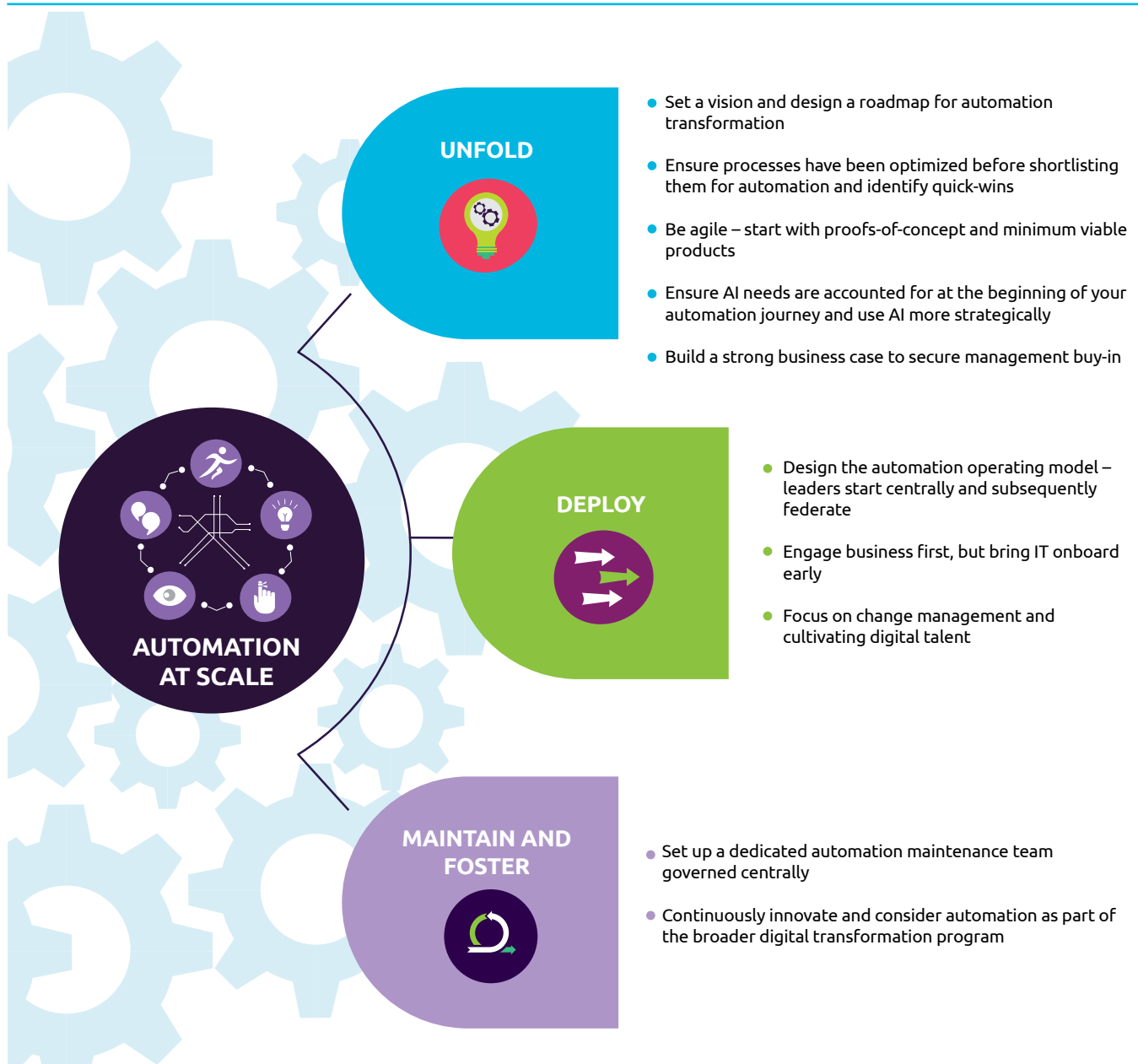**We encourage employees to suggest automation initiatives**

78% leaders

vs.

68% all other organizations

Source: Capgemini Research Institute, Automation Use Case Survey; July 2018, N=705 organizations, N=72 automation leaders, N=633 all other organizations that are experimenting with or implementing automation initiatives.

How to scale automation and propel growth

To realize automation's potential, organizations need to develop it as a strategic skill. To accomplish this, we've developed an approach that runs from setting a vision to continuous innovation (see Figure 15).

Figure 15. Recommendations for how to scale automation and drive growth

UNFOLD

- Set a vision and design a roadmap for automation transformation
- Ensure processes have been optimized before shortlisting them for automation and identify quick-wins
- Be agile – start with proofs-of-concept and minimum viable products
- Ensure AI needs are accounted for at the beginning of your automation journey and use AI more strategically
- Build a strong business case to secure management buy-in

DEPLOY

- Design the automation operating model – leaders start centrally and subsequently federate
- Engage business first, but bring IT onboard early
- Focus on change management and cultivating digital talent

MAINTAIN AND FOSTER

- Set up a dedicated automation maintenance team governed centrally
- Continuously innovate and consider automation as part of the broader digital transformation program

Source: Capgemini Research Institute.

Unfold automation's potential

Set a vision and design a roadmap for automation transformation

By setting a vision for automation, organizations will have clarity on what they want to achieve. This means not just seeing automation as a route to operational gains, but also to drive customer engagement and, ultimately, revenue. This involves:

- Ensuring the vision and strategy are integrated into the overall digitization strategy and not a standalone initiative
- Ensuring leadership actively shares and communicates the vision – over 80% of leading automation organizations agree that their leadership understands the importance of automation to their organization

The accounting operations program leader for a leading consumer products company reinforces the importance of an automation vision and roadmap. "You need to set a strategic vision for automation – you need to know why you are doing this and the boundaries and decision criteria on how you are going to leverage the use cases," he says. "You need to have rules in place that everyone will stick to so that you can prioritize things, otherwise it will be chaos."

An automation roadmap is very critical to achieving objectives. This identifies and prioritizes the processes for automation, assesses the potential impact on people, and assesses the technology options available.

Ensure processes have been optimized before shortlisting them for automation and identify quick wins

A proper selection and assessment of the suitability of business processes for automation is crucial for success, especially when evaluating automation of existing processes, most commonly through rule-based technologies. Capgemini's approach helps in the identification of the right processes to automate and robotize. Re-imagining an AI-first approach can help in mapping processes and even re-engineering certain processes (see Figure 16).

Organizations should ensure that they stabilize and optimize their processes prior to applying automation. "My team is always looking for new ways to improve cycle times, overall lead time, quality, and the client experience," says Paul Sharrock, VP of business process improvement and process automation at ADP, a large payroll and HR services provider. "RPA technology really supports this and is always considered during re-engineering workshops. While I am sure that most of business process improvement projects in the future will involve RPA, the focus is on the optimization of the process coming first, not the tool that will deliver it. First, we standardize, we improve, and then we automate." [33]

Organizations can start with quick-win use cases that are not too complex and offer strong benefit and value upside (more details in Figures 13 and 14). As our research shows, only a third of organizations are implementing quick-win use cases at scale, which leaves plenty of room for organizations to build a competitive advantage. After successful implementation of automation in one function or process, the experience gained and existing infrastructure can be used for automation implementations in other areas. At the same time, expanding automation from easy to complex use cases will drive further benefits (see Figure 12 for use cases that have medium to high complexity while driving significant benefits).

Organizations should also note that automation technologies, specifically AI, not only help support the optimization of existing processes but also open new avenues (such as social media and connected devices) to leverage data sources to improve the customer experience by capturing and processing huge volumes of structured and unstructured data. The AI use cases should be selected post the evaluation of current and target customer journeys.

BP plc is embracing automation and machine learning in its midstream operations (i.e., trading and supply) to move technology from a cost center to a revenue generator to maximize the value of where they buy and sell. Ayman Assaf, CIO for compliance, regulatory, risk and finance at BP Supply and Trading says: "We are seeing that automation is not only about streamlining a process to achieve more efficiency. It also allows you to reduce process risks and increase reliability across our operations. With the introduction of AI and ML applications, along with our data lake, we believe there are huge business growth opportunities." [34]

Figure 16. Capgemini's approach for automation process selection

0 **Prepare**
Identify and document process

1 **Eliminate**
Identify sources of effort and eliminate them at their roots

2 **Standardize**
Standardize operation process within organization or team

3 **Optimize**
Reduce time spent in handling end-to-end work

4 **Automate**
Deploy technology to automate standardized processes

5 **Robotize**
Use RPA for repetitive/rule-managed processes

6 **Augment**
Add more intelligence and autonomy to processes with AI

7 **Re-imagine**
Apply AI-first approach to challenge the status quo

Source: Capgemini.

Be agile – start with proofs of concept and minimum viable products

The proof of concept (PoC) shows the technical feasibility of rule-based solutions within the organization's IT environment and the minimum viable product (MVP) demonstrates the minimum functionalities of the AI solution. PoCs and MVPs not only test the operating model but can also address any doubts or concerns that leaders have about the benefits of automation. An agile approach – involving small steps, small failures, and fast recovery – can deliver the quick results that clearly demonstrate automation's value. Organizations should also capture successes, identify ambassadors in the organization, and keep the relevant stakeholders updated on the progress of the automation journey.

The CIO of United Utilities, UK, William Hewish, sees automation as an experiment that the organization "never knew they wanted until it arrived." At United Utilities, a small team used a lean and agile approach, with short-term programs that developed proofs of concept and business cases for some of the company's key challenges. He adds: "The company has automated well over 20,000 manual hours of work." [35]

Ensure AI needs are accounted for at the beginning of your automation journey and use AI more strategically

New use cases in artificial intelligence are emerging every day and are particularly compelling in instances where rule-based automation only delivers a fraction of automation's potential. Organizations should evaluate AI needs and technology choices at the onset of their automation planning exercise. They also need to make sure to get their data basis right as the "learned" algorithms cannot be smarter than the underlying data provided. Organizations need to align their data and IT security to identify all fields of data which can be used based on technical feasibility and data security constraints.

However, organizations also need to evaluate how they can use AI, which is built on a strong foundation of automation and is a part of their broader automation plan, more strategically. While the AI technologies in Amazon Go stores may be sophisticated, they are built on the back of Amazon's infrastructure, which has a strong foundation of automation in logistics, inventory, fulfillment, and transactions. [36]

Organizations should also consider using open standards for automation, so they do not get tied in to proprietary technology. Organizations need to make sure that they can swap new technology in and out and whatever they choose can be plugged into their existing platforms and be ported across different platforms as they choose to scale up. Leeds Teaching Hospitals NHS Trust's bespoke Electronic Health Record (EHR), enabled with automation technologies, is built on open standards and can be integrated with more than 40 additional systems across the hospital. [37]

Build a strong business case to secure management buy-in

Securing top-down commitment and buy-in for automation is critical, and the business case plays an important role here. This means quantifying costs (including licenses, set-up, testing, implementation, change management) as well as tangible and intangible benefits and setting a realistic expectation for return on investment. A business case for each process that will be automated is essential to prioritize investments. We found that close to three-quarters of automation leaders (71%) say they have a clear idea of where to invest in new automation technologies.

Deploy automation for leveraging value

Design the automation operating model – leaders start centrally and subsequently federate

To understand how organizations were approaching automation governance and implementation, we looked at three models:

- **Centralized,** where an automation center of excellence or a centralized IT or business team oversees automation initiatives
- **Hybrid,** where governance and implementation are divided across both central teams and non-central teams
- **Decentralized,** where governance and implementation are devolved to specific business units/geographies.

In our research, 36% of organizations employ a centralized governance structure and 38% employ a decentralized implementation structure. A centralized model works well when organizations are starting their automation journey. It can help deliver more standardization, ensure that knowledge gained from one implementation is passed on for the next and improve speed and agility. A central automation command center proactively monitors progress, benefits, capacity, and interdependencies.

For the program leader for accounting operations at a leading consumer products goods company, centralized governance provides strong oversight and compliance. "We need to ensure proper standards in governance around the robots," he says. "We need to make sure that people aren't creating robots left and right without proper oversight and compliance."

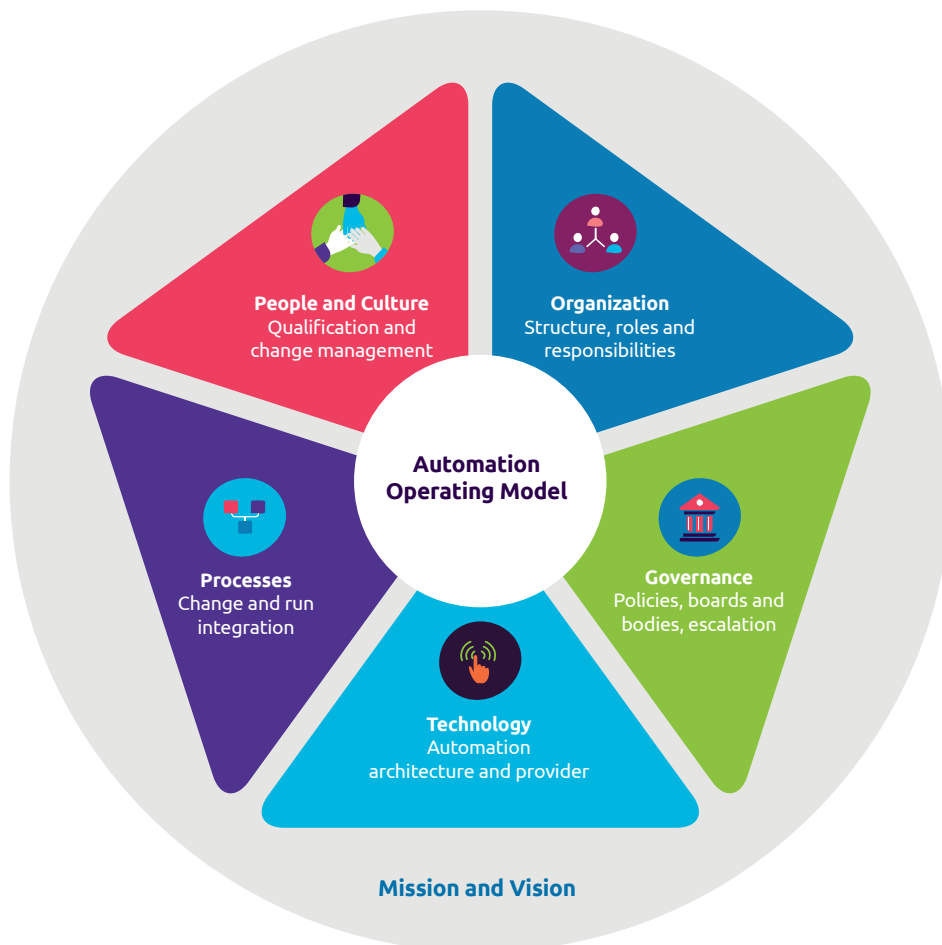As the organization's automation capability becomes more mature, organizations can consider devolving implementation to individual business units, keeping centralized governance and control. In this way, you gain from the existing strong and centralized governance while drawing on the agility offered by multiple implementation centers in the business.

In addition to the governance and implementation structure, organizations must consider the design of other key components of the automation operating model. Figure 17 highlights the automation operating model's framework for success.

Engage business first, but bring IT onboard early

Federated organizational models will require that technology and business teams work closely together. Electing the right process for automation becomes even more crucial and IT and business need to work collaboratively. "Business and IT should work hand in hand," says the head of global operations at a leading industrial manufacturing company. "The project will fail if you call it a sole IT project or a sole business project." Automation should be driven by business areas, however early involvement of IT is vital for success, as automation impacts infrastructure, security, business continuity, and disaster recovery. Organizations also need to make sure that the infrastructure grows together at the same pace with automation and that automation complies with IT's governance and architecture policies.

Figure 17. Automation operating model framework

People and Culture
Qualification and change management

Organization
Structure, roles and responsibilities

Automation Operating Model

Governance
Policies, boards and bodies, escalation

Processes
Change and run integration

Technology
Automation architecture and provider

Mission and Vision

Source: Capgemini Invent.

Focus on change management and cultivating digital talent

Given the impact of automation on people, many organizations struggle with change management, fear of job losses, and employee resistance. Involving employees in initiatives, clearly communicating the vision, and encouraging people to actively participate are therefore critical. Communications should emphasize that automation can be used to remove the mundane, repetitive tasks from their day-to-day work, providing them with an opportunity to focus on more value-added activities. Nearly 80% of automation leaders say that they encourage their employees to suggest automation initiatives. To gain success, engage a dedicated team of change and communication, in charge of raising awareness in the business of the benefits of automation.

Our previous research on digital talent found out that 54% of the companies believe that their shortage of digital talent is hampering their digital transformation. [38] Organizations need to cultivate talented people who are skilled in automation technologies, from up-skilling existing team members or bringing in new blood. Over half (57%) of organizations in our research agree that the lack of talent skilled in automation technologies is a top challenge for their organization.[39]

Maintain and foster automation

Set up a dedicated automation maintenance team governed centrally

The task of automation does not end with implementation, as ongoing maintenance is required to ensure smooth operations, particularly with rule-based technologies. Organizations and sectors face many changes – from software interfaces and company processes to data formats and market and regulatory guidelines – which call for ongoing maintenance and monitoring of automation initiatives. This is a key challenge for many organizations. According to a senior director of project management at a regional bank: "Without realizing it, all of a sudden, we had 100 bots running in our data center. Our focus shifted from deployment to management."

A CoE approach with a structured governance and clear processes and responsibilities in place, as well as skilled staff trained to maintain automation are a few areas organizations could focus upon. Organizations should look to employ dedicated automation project execution and maintenance team coordinated through central command center. Organizations should also focus on developing a shared reusable asset library by functional area over time.

Continuously innovate and consider automation as part of the broader digital transformation program

In other recent research, we found that 53% of organizations say that their senior management or leadership see automation as a key enabler of business model innovation.[40] Yet, only 16% of organizations say that they have deployed multiple use cases at scale in our current research. There is significant untapped potential for those organizations that treat automation as a continuous transformation program. Like any innovation program, automation should be approached with a test-and-learn philosophy. And, it should not be a standalone solution within organization but integrated into an organization's broader digital transformation program.

Conclusion

Automation has significant potential, from radical transformation of efficiency to new revenue opportunities. However, few organizations are currently realizing the full upside, and many are struggling to accomplish scale and value. Initiatives are carried out in pilots and in silos, and only a few are focused on targeting the right use cases and driving them at scale. While rule-based technologies are significantly contributing to efficiency gains today, emerging intelligent automation technologies bring in a plethora of exciting opportunities to drive customer experience as well as top-line growth.

To drive return on their automation investments, leaders need a bold vision and a clear roadmap to build momentum and bring the organization behind them. It needs to be recognized that automation is a technology solution to business transformation, and hence both business and technology leadership should be engaged actively from day one. Automation needs to be tackled as an end-to-end strategic transformation program as opposed to a series of tactical deployments. Also, to maximize the benefits and ROI of automation investments, it is essential that processes and business models are standardized and optimized before they are enabled by automation, robotics, and artificial intelligence.

Automation is an ongoing and continuous process and organizations should establish strong governance for sustainable engagement with a combination of a centralized and federated approach. And, given that this is a fast-moving field, leaders will need to continually maintain existing automation and have an appetite to continuously innovate – always looking at how inefficient processes can be transformed to deliver new levels of performance, transform the customer experience, and create new revenue opportunities.
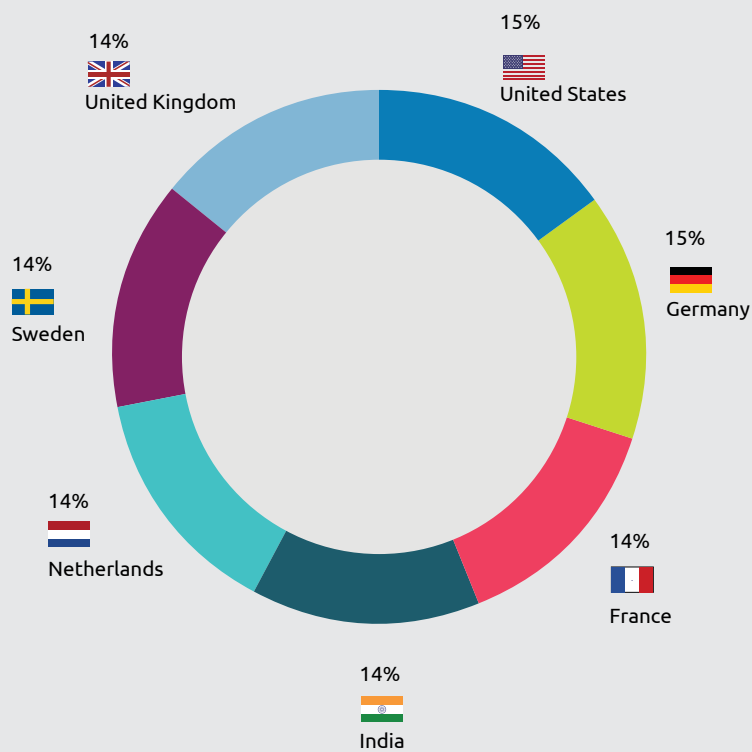
Research Methodology

We surveyed 705 business leaders from organizations with greater than $500 million revenue in FY 2017 that are experimenting with or implementing automation across a range of sectors and countries. Forty percent of the organizations have revenue greater than $10 billion. The global survey took place in July 2018.

The functions we focused on were information technology, procurement, supply chain, manufacturing, finance and accounting, human resources, sales and marketing, research and development, account management, customer service/support, customer experience, and general management/strategy.

Organizations experimenting with or implementing automation by geography

14%
United Kingdom

15%
United States

14%
Sweden

15%
Germany
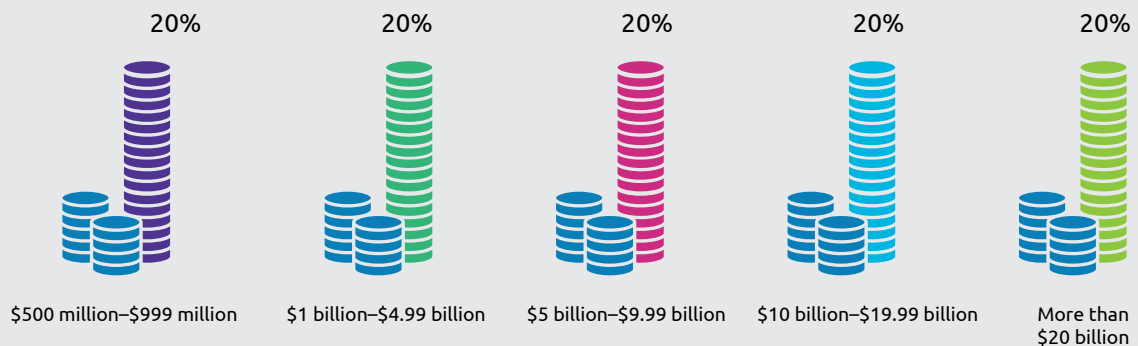
14%
Netherlands

14%
France

14%
India

Source: Capgemini Research Institute, Automation Use Case Survey; July 2018, N=705 organizations that are experimenting with or implementing automation initiatives.

Organizations experimenting with or implementing automation by sector*

4%
Consumer Packaged
Goods Manufacturing

11%
Public Sector

18%
Automotive

19%
Industrial Manufacturing

24%
Retail

24%
Utilities

Organizations experimenting with or implementing automation by function

6%
Human Resources

8%
Research and
Development

10%
Sales and
Marketing

10%
Finance and
Accounting

10%
General Management

16%
Manufacturing/Procurement/-
Supply Chain

20%
Customer Service/Account
Management/Customer
Experience

20%
Information
Technology

Organizations experimenting with or implementing automation by level

50%	30%	20%
Directors	Manager	C - Level

Organizations experimenting with or implementing automation by revenue

20%	20%	20%	20%	20%
$500 million–$999 million	$1 billion–$4.99 billion	$5 billion–$9.99 billion	$10 billion–$19.99 billion	More than $20 billion

We also conducted in-depth focus interviews with industry leaders examining the impact of automation on their organization, benefits, implementation challenges, and emerging best practices.

*The financial services sector is not included in the scope of this study owing to our recent research on automation in financial services: *"Growth in the machine, how financial services can move intelligent automation from a cost play to a growth strategy."*

A note about the analysis:

The total number of survey respondents is 705, however the target audience for this survey represents companies experimenting with or implementing automation. The objective of the survey was to understand how automation is currently being implemented and is not meant to represent overall automation penetration.

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We believe that intelligent automation is not only about new age technology. For We We believe that intelligent automation is not only about new age technology. For Capgemini and our clients, it's much more. We are working with market-leading brands and organizations from across industries, helping them to orchestrate new ways of working, and embedding intelligent automation into their operations to drive continuous innovation and business impact.

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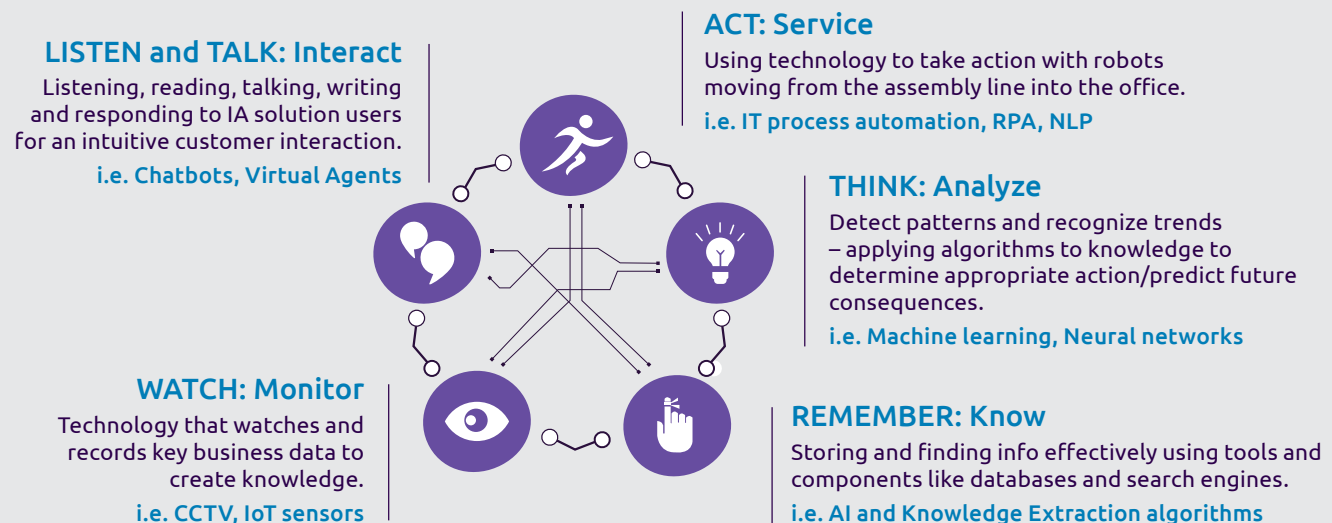
The suite brings three dynamic components (framework, tools and IP, and services), orchestrated around the

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The Five Senses of Intelligent Automation:
Translating Intelligent Automation technology into tangible business value

LISTEN and TALK: Interact
Listening, reading, talking, writing and responding to IA solution users for an intuitive customer interaction.
i.e. Chatbots, Virtual Agents

ACT: Service
Using technology to take action with robots moving from the assembly line into the office.
i.e. IT process automation, RPA, NLP

THINK: Analyze
Detect patterns and recognize trends – applying algorithms to knowledge to determine appropriate action/predict future consequences.
i.e. Machine learning, Neural networks

WATCH: Monitor
Technology that watches and records key business data to create knowledge.
i.e. CCTV, IoT sensors

REMEMBER: Know
Storing and finding info effectively using tools and components like databases and search engines.
i.e. AI and Knowledge Extraction algorithms

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The Capgemini Research Institute is Capgemini's in-house think tank on all things digital. The Institute publishes research on the impact of digital technologies on large traditional businesses. The team draws on the worldwide network of Capgemini experts and works closely with academic and technology partners. The Institute has dedicated research centers in India, the United Kingdom, and the United States. It was recently ranked Top 1 in the world for the quality of its research by independent analysts.
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Intelligence Decoded

Understanding Digital Mastery
Today: Why Companies Are
Struggling With Their Digital
Transformations

Conversational Commerce:
Why Consumers Are Embracing
Voice Assistants in Their Lives

Unlocking the
business value of IoT
in operations

The Secret to Winning Customers'
Hearts With Artificial Intelligence:
Add Human Intelligence

Automotive Smart Factories:
Putting automotive manufacturers
in the digitalindustrial revolution
driving seat

The Digital Talent Gap: Are
Companies Doing Enough?

Loyalty Deciphered: How Emotions
Drive Genuine Engagement

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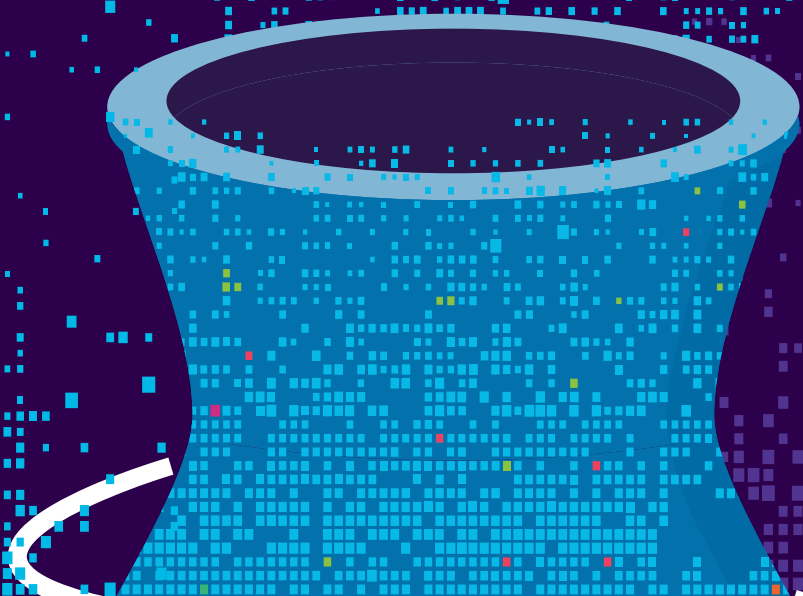
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