FOReSiGHT

WHITEPAPER ON INTELLIGENT AUTOMATION

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Its English Version may also be found on the BLOCKS Platform.
https://platform.blocks.ase.ro/

The Project

Project FOReSiGHT - Flexibility and Resilience in Digital Transformation and Intelligent Automation – Advanced Skills and Tools for Academia and Entrepreneurs.

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Introduction

Purpose of the whitepaper

The rapid advancement of technology and the increasing complexity of business processes have led to the emergence of Intelligent Automation (IA) as a critical area of interest for organizations worldwide. IA, which combines artificial intelligence and automation, is transforming how businesses operate, offering unprecedented opportunities for efficiency, innovation, and growth.

This whitepaper aims to provide a comprehensive overview of the current state and future prospects of IA. It is designed to serve as a valuable resource for a broad audience, including policymakers, business leaders, researchers, and anyone interested in understanding the impact and implications of IA. We have drawn on various sources, such as industry and regulatory reports, to ensure a balanced and informed perspective.

The primary objectives of this whitepaper are:

- To present an economic perspective on IA, highlighting its potential benefits and challenges.
- To introduce an IA framework based on four strategic pillars: invest, experiment, maintain, and divest, providing guidance for organizations on how to approach and manage IA.
- To explore the different work personas in IA and the skills required for IA workers, offering insights into the human aspect of IA.
- To provide insights on the state of IA in specific European countries, including Romania, Germany, Belgium, Italy, and Croatia.
- To discuss current trends in IA and their implications for the future.
- To explore the concept of "Automation for Good", examining the ethical considerations of IA and its potential to contribute to societal good.

Through this whitepaper, we hope to contribute to the ongoing dialogue on IA, providing readers with the knowledge and insights they need to navigate this rapidly evolving field.

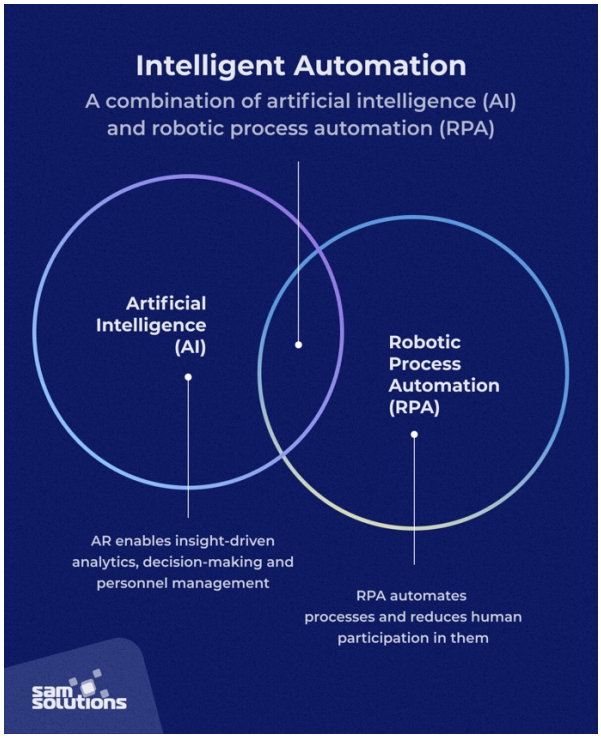
Basics of Intelligent Automation

Intelligent Automation (IA) is a transformative technology that combines the capabilities of Robotic Process Automation (RPA) and Artificial Intelligence (AI) to automate complex processes that require decision-making and learning from experience[1]. The importance of IA in today's digital age cannot be overstated. It is reshaping how businesses operate, offering unprecedented opportunities for efficiency, accuracy, and scalability. IA is not just about automating tasks but about augmenting human capabilities and freeing employees to focus on higher-value activities. It enables organizations to automate complex processes previously thought to be the exclusive domain of humans. This includes tasks that require understanding natural language, recognizing patterns, making rules-based decisions, and learning from past experiences. Nonetheless, automation may still displace 85 million jobs by 2025[2].

Intelligent Automation (IA) is a cutting-edge field that combines traditional automation with artificial intelligence (AI) to create systems capable of performing tasks that typically require human intelligence. These tasks range from simple rule-based activities to complex processes requiring decision-making, problem-solving, and learning capabilities[3].

Two key technologies at the heart of IA are Robotic Process Automation (RPA) and Artificial Intelligence (AI).

[1] https://www.uipath.com/rpa/intelligent-process-automation
[2] https://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf
[3] https://www.gartner.com/en/information-technology/glossary/robotic-process-automation-rpa



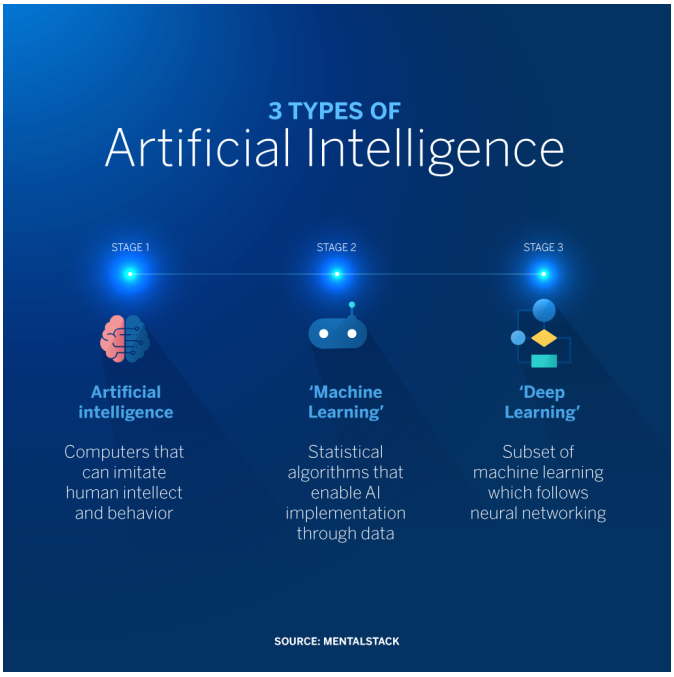
Source: SAM Solutions, 2023[4]

Robotic Process Automation (RPA) is a technology that uses software robots or 'bots' to automate repetitive, rule-based tasks. These bots can interact with digital systems and software just like a human user, performing tasks such as data entry, processing transactions, and responding to simple customer service queries[5].

Artificial Intelligence (AI), on the other hand, refers to a set of technologies that enable machines to mimic human intelligence. This includes machine learning (where machines can learn from experience), natural language processing (where machines can understand and generate human language), and computer vision (where machines can interpret visual information)[6]. Artificial intelligence (AI) may also be categorized into three types:

- Artificial Narrow Intelligence (ANI)
- Artificial General Intelligence (AGI)
- Artificial Super Intelligence (ASI)

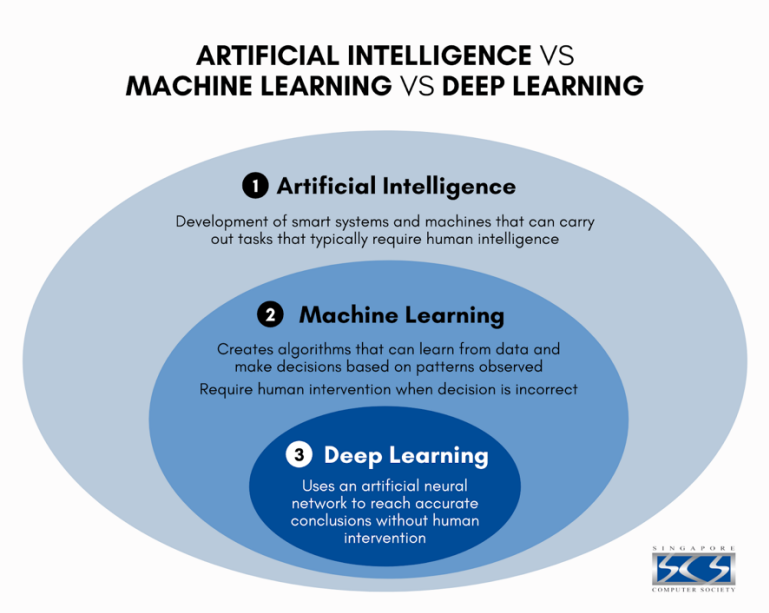
[4] https://www.mckinsey.com/featured-insights/future-of-work/skill-shift-automation-and-the-future-of-the-workforce
[5] https://www.uipath.com/rpa/robotic-process-automation
[6] https://www.mckinsey.com/capabilities/quantumblack/our-insights/an-executives-guide-to-ai



Source: MentalStack by BBVA, 2023[7]

When combined, RPA and AI create Intelligent Automation systems that can perform repetitive tasks, learn from experience, adapt to new situations, and make decisions based on complex rules and patterns. This makes IA a powerful tool for improving efficiency, reducing errors, and freeing human workers to focus on more strategic, creative tasks[8].

[7] https://www.bbvaopenmind.com/en/technology/artificial-intelligence/intellectual-abilities-of-artificial-intelligence/
[8] https://www.ey.com/en_ro/intelligent-automation



Source: SCS, 2020[9]

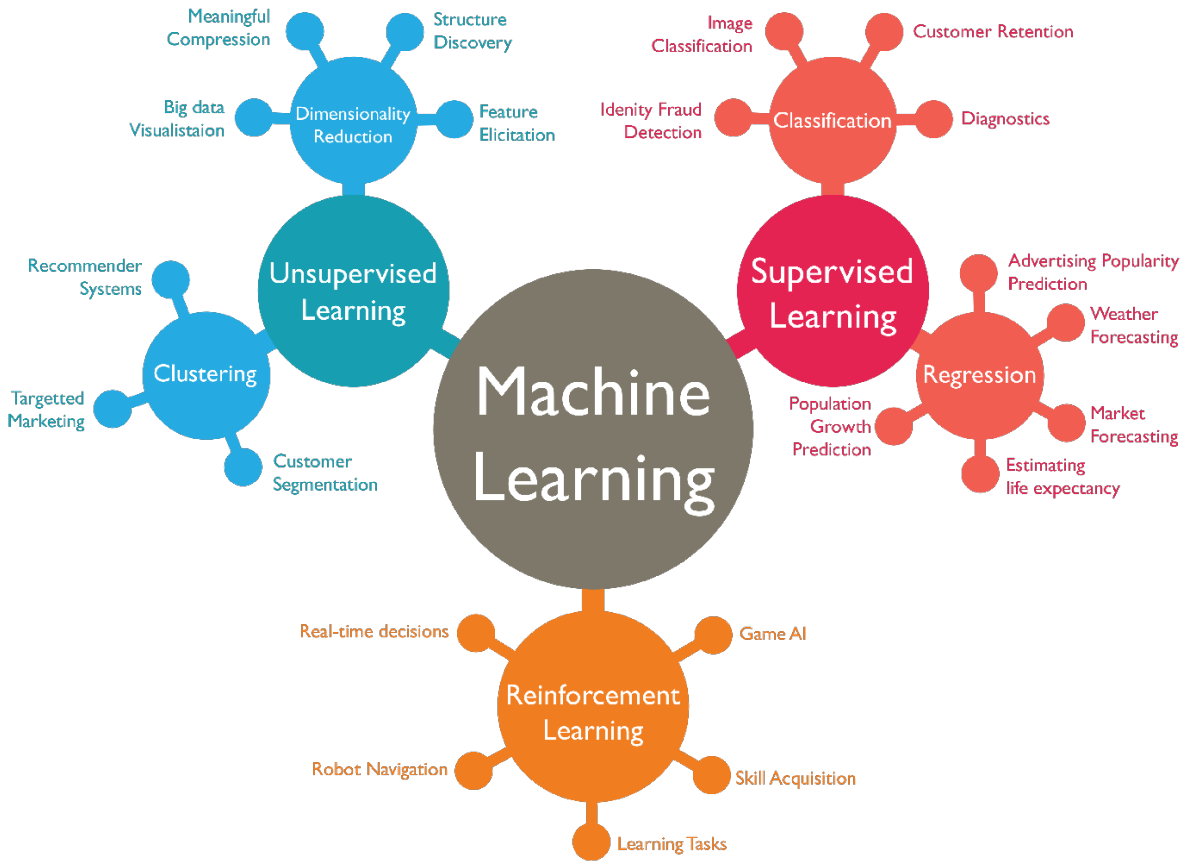
The concept of IA also extends to include other technologies, such as chatbots, virtual agents, and intelligent document processing, which use AI to interact with users, answer queries, and process unstructured data[10].

Source: SAM Solutions, 2023[11]

[9] https://www.scs.org.sg/articles/machine-learning-vs-deep-learning
[10] https://www.bearingpoint.com/en/services/technology/data-analytics-ai/
[11] https://www.mckinsey.com/featured-insights/future-of-work/skill-shift-automation-and-the-future-of-the-workforce

As we delve deeper into the realm of Intelligent Automation (IA), we encounter more advanced technologies and concepts that extend beyond the foundational elements of Robotic Process Automation (RPA) and basic Artificial Intelligence (AI). These advanced elements of IA enable more complex tasks to be automated and allow for greater adaptability and learning capabilities[12].

One such advanced technology is **Machine Learning (ML)**, a subset of AI that enables machines to learn from data without being explicitly programmed. ML algorithms can identify patterns in large datasets and make predictions or decisions based on these patterns. This technology is instrumental in IA for tasks such as predictive maintenance, fraud detection, and customer segmentation[13].



Source: WordStream, 2021[14]

[12] https://www.gartner.com/en/information-technology/glossary/robotic-process-automation-rpa
[13] https://www.mckinsey.com/capabilities/quantumblack/our-insights/an-executives-guide-to-ai
[14] https://www.wordstream.com/blog/ws/2017/07/28/machine-learning-applications

Natural Language Processing (NLP) is another advanced AI technology often used in IA. NLP enables machines to understand and generate human language, allowing them to interact with users more naturally and intuitively. This technology is commonly used in chatbots and virtual assistants, which can understand user queries and provide relevant responses[15]. Learn more about NLP at DeepLearning.ai[16]

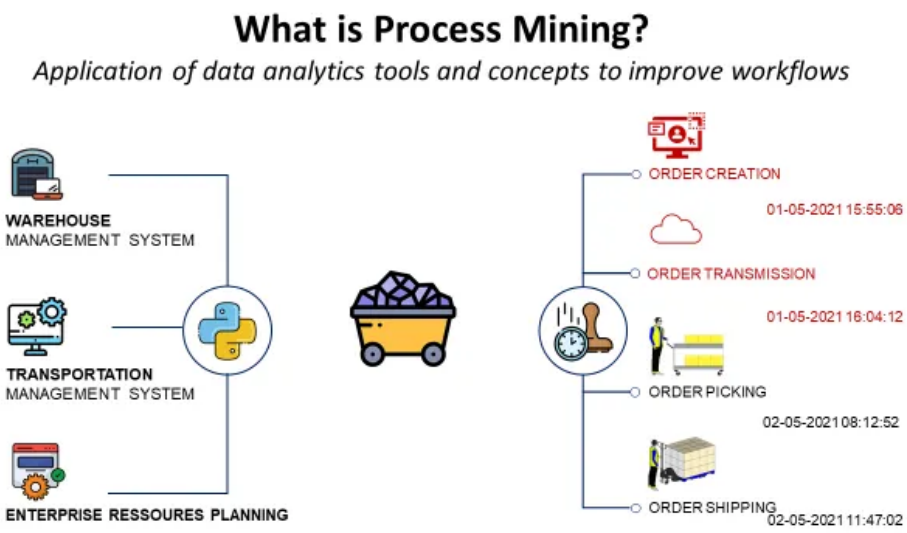
Cognitive Automation, another advanced concept in IA, refers to systems that can handle unstructured data (such as text, images, and voice) and make decisions based on this data. These systems use a combination of ML, NLP, and other AI technologies to mimic human cognition, enabling them to perform tasks such as document analysis, sentiment analysis, and even medical diagnosis[17].

	RPA	Cognitive Automation
Purpose	To automate mundane, everyday tasks	To bring AI and ML technology into the automation workflow and assist humans in decision-making
Type	Process-oriented	Knowledge-based
Automation Level	Simple day-to-day tasks	More complex tasks
ROI Time	Almost immediate	Takes time
Technical Skills	Uses basic technologies such as screen mapping, automation, etc.	Uses advanced technologies such as NLP, data mining, semantic analysis, etc.
Human Intervention	Requires human intervention for handling exceptions	Can handle exceptions on its own and requires no human intervention
Use Cases	Data entry, claims processing, resume scanning, order processing.	Trend analysis, customer service interactions, behavioral analysis, email automation, etc.

Source: ApexOn, 2021[18]

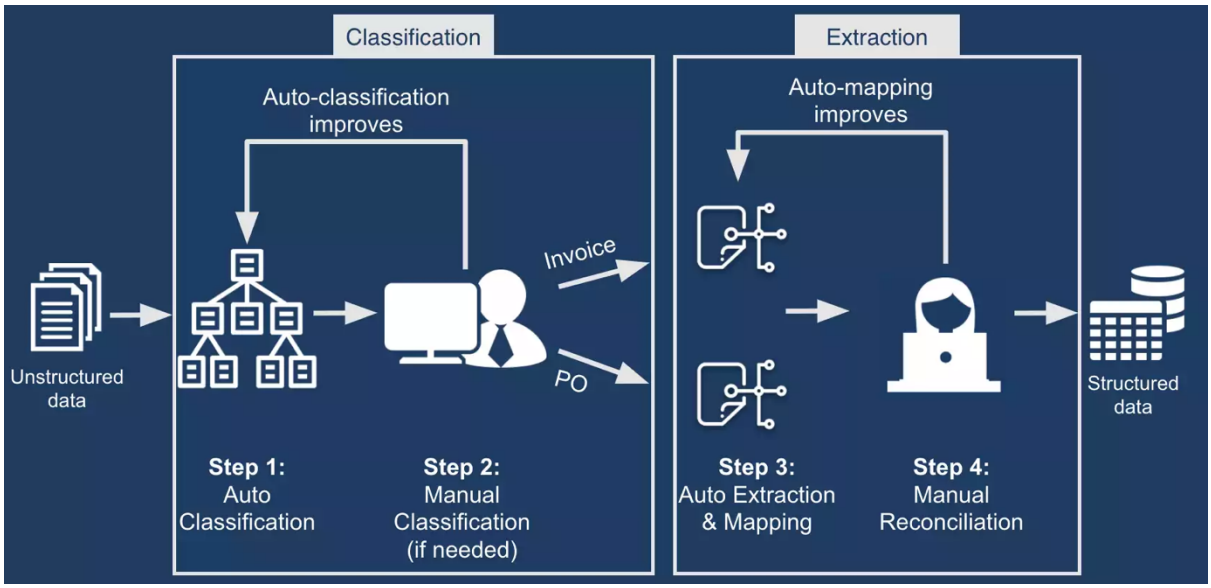
Process Mining is a technique used in IA to discover, monitor, and improve actual processes by extracting knowledge from event logs readily available in today's information systems[19]. This technique allows organizations to gain insights into their operations and identify opportunities for automation.

[15] https://forum.uipath.com/t/nlp-implementation-through-uipath/147925
[16] https://www.deeplearning.ai/resources/natural-language-processing/
[17] https://www.techtarget.com/searchcio/definition/cognitive-automation
[18] https://www.apexon.com/blog/rpa-vs-cognitive-automation-what-you-need-to-know/
[19] https://www.bearingpoint.com/en-ie/insights-events/insights/process-mining/



Source: Towards Data Science, 2021[20]

Intelligent Document Processing (IDP) is an advanced application of IA that involves extracting and processing information from unstructured documents. IDP solutions use a combination of OCR (Optical Character Recognition), ML, and NLP to convert unstructured data into a structured format that can be used for further analysis or processing[21].



Source: Towards Data Science, 2021[22]

[20] https://towardsdatascience.com/what-is-process-mining-683b5eb6547c

[21] https://www.uipath.com/product/document-understanding

[22] https://www.altexsoft.com/blog/intelligent-document-processing/

As with any specialized field, Intelligent Automation (IA) comes with its own set of terminologies and jargon. Understanding these terms is crucial for effective communication and collaboration within the area. However, the rapid evolution of IA technologies and the diversity of disciplines involved can often lead to a "vocabulary gap," where different stakeholders may use other terms to refer to the same concept or the same word to refer to different concepts.

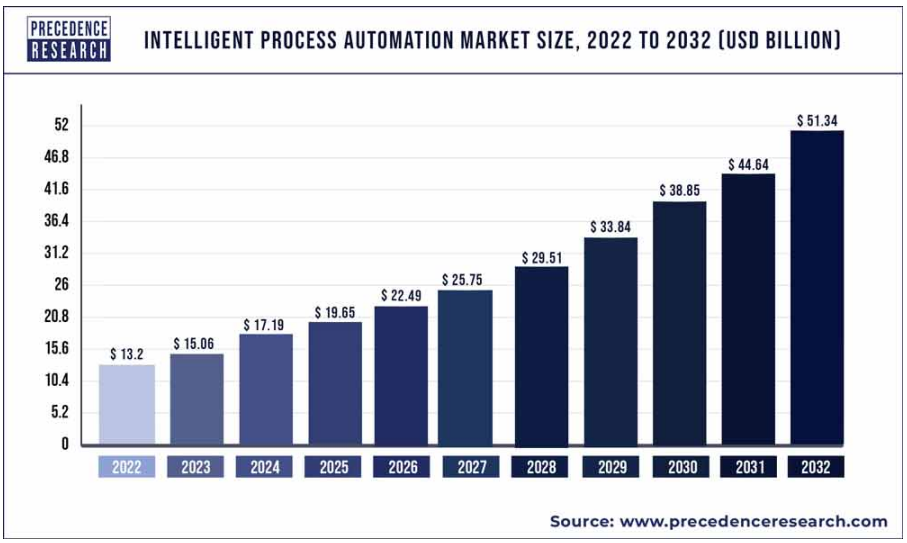
Bridging this vocabulary gap is an essential aspect of learning in IA. It involves learning the definitions of key terms and understanding their context and how they are used in practice. This can help to ensure clear communication, reduce misunderstandings, and facilitate effective collaboration among IA professionals.

Some of the key terms in IA include:

Robotic Process Automation (RPA)	The use of software robots to automate repetitive, rule-based tasks.
Artificial Intelligence (AI)	A set of technologies that enable machines to mimic human intelligence.
Machine Learning (ML)	A subset of AI that enables machines to learn from data without being explicitly programmed.
Natural Language Processing (NLP)	An AI technology that enables machines to understand and generate human language.
Cognitive Automation	Systems that can handle unstructured data and make decisions based on this data.
Process Mining	A technique used to discover, monitor, and improve real processes by extracting knowledge from event logs.
Intelligent Document Processing (IDP)	The extraction and processing of information from unstructured documents using a combination of OCR, ML, and NLP.

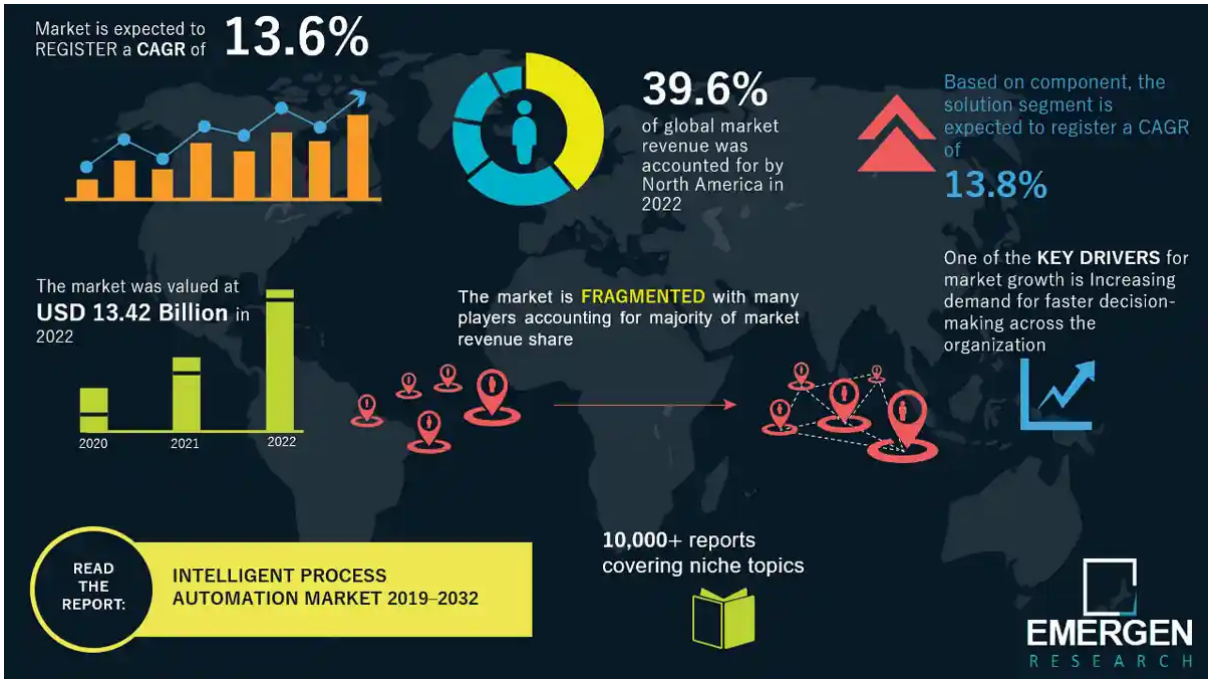
The impact of IA is far-reaching, spanning various industries and sectors, and its importance is proliferating. It can transform operations, customer service, IT management, and other business areas. By automating routine tasks, IA allows businesses to deliver services more efficiently and accurately, improving customer satisfaction and competitive advantage.

Moreover, IA plays a crucial role in data analysis and decision-making. It can process vast amounts of data much faster and more accurately than humans, providing valuable insights to drive strategic decision-making. IA can also learn from these data, improving its performance over time.



Source: Precedence Research, 2022[23]

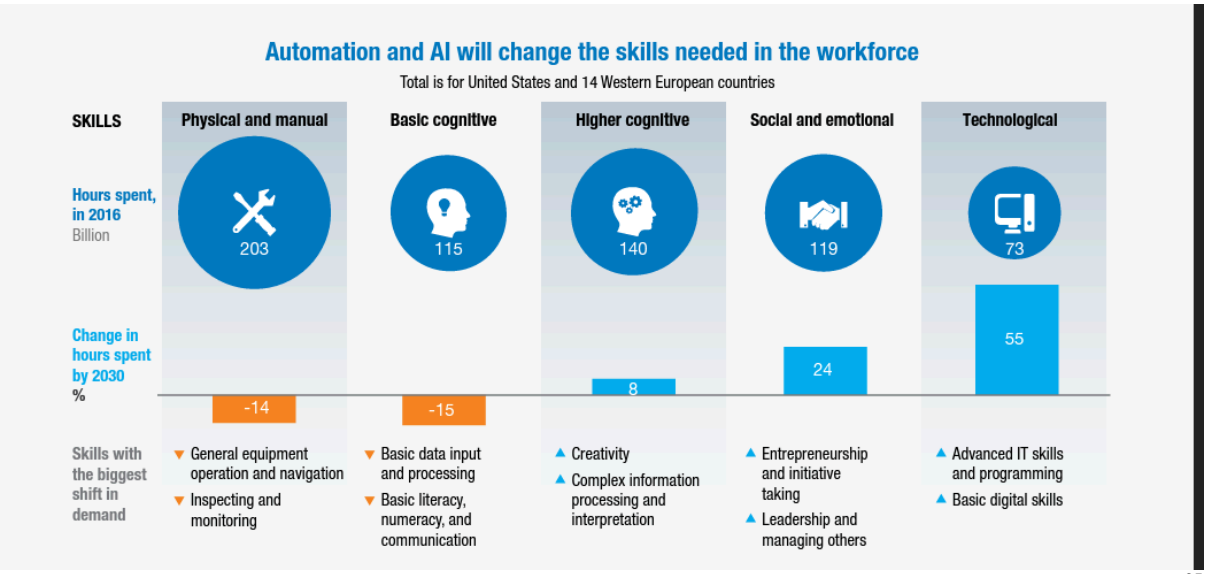
[23] https://www.precedenceresearch.com/intelligent-process-automation-market - link for 2023 report



Source: Emergen Research, 2023[24]

The Need for Skilled Workers in IA

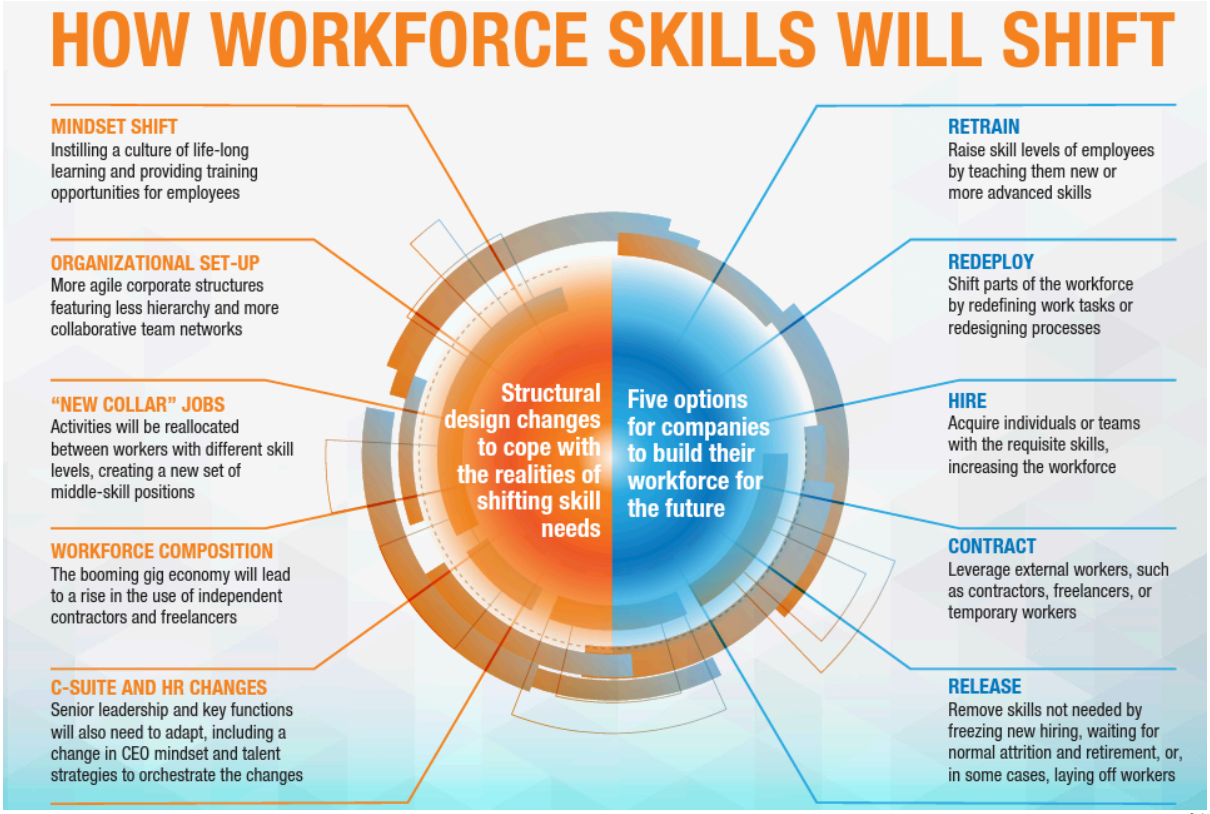
The growing importance of IA is creating a demand for skilled workers in the field. The need for skilled IA workers is driven by several factors, including the increasing complexity of IA technologies, the growing number of organizations adopting IA, and the need for IA workers to have a deep understanding of both business and technology.



Source: McKinsey, 2018[25]

[24] https://www.emergenresearch.com/industry-report/intelligent-process-automation-market
[25] https://www.mckinsey.com/featured-insights/future-of-work/skill-shift-automation-and-the-future-of-the-workforce

There are several challenges associated with developing skills in IA. One challenge is the rapidly changing nature of the field. IA technologies are constantly evolving, which means that IA workers need to be able to keep up with the latest trends. Another challenge is the need for more available training programs. A limited number of training programs offer comprehensive instruction in IA. This makes it difficult for people to find the training they need to develop the skills they need to be successful in the field.



Source: McKinsey, 2018[26]

The Need for a Structured Approach to Curriculum Development

Despite the significant benefits of IA, its adoption is challenging. These include the need for substantial upfront investment, the complexity of integrating IA technologies with existing systems, and the need for skills and expertise to manage and maintain these systems. Therefore, a structured approach to learning and skills development is essential to harness the full potential of IA.

The challenges associated with developing skills in IA highlight the need for a structured approach to curriculum development. A structured curriculum ensures that students are exposed to the latest IA technologies and can develop the skills they need to succeed in the field.

[26] https://www.mckinsey.com/featured-insights/future-of-work/skill-shift-automation-and-the-future-of-the-workforce

The Economic Perspective of IA

As argued by Ng et al. (2021), with the latest developments in robotic process automation (RPA) and artificial intelligence (AI), both academics and industrial practitioners are now chasing robust and adaptive decision making (DM) in real-life engineering applications as well as automated business workflows and processes in order to accommodate context awareness, adaptation to environment, and customization, among other features. Ng et al. (2021) continue to explain that robotic process automation, artificial intelligence, and soft computing are enabling advanced decision analysis methodologies, data-driven decision making, and scenario analysis with relation to the examination of decision options, and this is proving to be beneficial in a wide range of engineering applications. According to Ng et al. (2012), intelligent automation is the mixture of robotic process automation, artificial intelligence, and soft computing, and it is currently growing as a filed, making it possible to attain new levels of operational efficiency, decision quality, and system dependability. Using robotic process automation, an intelligent agent can eliminate operational errors and mimic manual routine decisions in a digital system, and these decisions can include rule-based, well-structured, repetitive decisions involving enormous data, while artificial intelligence has the cognitive capabilities to emulate the actions of humans and process unstructured data through machine learning, natural language processing, and image processing (Ng et al., 2021). Moreover, Ng et al. (2021) argue that, when intelligent automation insights are applied to complex decision settings, such as those characterized by the existence of context-aware data and ambiguity as well as consumer preferences, new potential for automated decision making, problem diagnostics, knowledge elicitation and solutions open up. Therefore, in their study, Ng et al. (2021, pp. 5) present five research questions to which they answer by conducting an extensive systematic literature review, and the questions are:

(i) how can we harness the capabilities in intelligent automation to catalyze the business growth?;
(ii) what are the drivers and requirements for intelligent automation implementation?;
(iii) what are the insights and managerial implications of intelligent automation that can be derived from other industrial cases?;
(iv) what are the challenges of implementation of intelligent automation?; and
(v) what are the future research directions of intelligent automation?.

They provide very detailed answers to the stated research questions and conclude that intelligent automation research is a promising field that has the potential to have a significant influence on society in the future through the use of software agents, chatbots, and robots in automated corporate workflows and procedures (Ng et al., 2021).

Next, according to Lacity and Willcocks (2021), robotic process automation and cognitive automation have both shown to be highly effective tools for automating corporate processes. In their research, Lacity and Willcocks (2021) present the 39 action principles they have discovered are based on six years of study on hundreds of intelligent automation deployments in a variety of geographies, sectors, and processes. These principles are intended to help leaders through their intelligent automation journey, but, however, the authors argue that there is still much more to learn; intelligent automation initiatives are increasingly being linked with broader digital transformation efforts, and many firms are attempting to automate operations that span the boundaries of their enterprises (Lacity & Willcocks, 2021).

Gilabert and Arnaiz (2006) present a case study on intelligent automation systems for predictive maintenance solutions for non-critical machinery (such as elevators and machine tools). They present two scenarios which are distinct from one another, and emphasize that no previous expertise in elevator monitoring and diagnosis has been gained, while the modeling has been carried out utilizing Neural Networks to save time (Gilabert & Arnaiz, 2006). Also, the authors explain that machine tools, on the other hand, were monitored by vibration systems in cases where previous experience was available, and also explain that, specifically, Bayesian Networks are the paradigm of choice in that scenario, since it was also advised to incorporate some sort of adaption process for the knowledge represented by the network in this case (Gilabert & Arnaiz, 2006). The final system, as explained by Gilabert and Arnaiz (2006), also contains a sensor processing unit as well as a remote maintenance module system, which together provide an automated remote condition monitoring system for both applications, according to the manufacturer. The findings of this case study imply that partial solutions in monitoring and diagnosis are feasible, while further development will be required to build a complete solution in the future (Gilabert & Arnaiz, 2006). In addition, their paper describes the characteristics of the Bayesian Network solution that was eventually built for high-speed machine tools, evaluates its strengths and drawbacks, and suggests future refinements to the system (Gilabert & Arnaiz, 2006).

Vishnoi et al. (2019) use a comprehensive assessment of relevant literature to develop an automation-environment relationship grid and highlight the constraints that organizations face during the process of automating their operations, adoption, and effective implementation. They identify the following constraints: (i) model constraints, (ii) money restrictions, (iii) management constraints, (iv) men-machine constraints, (v) measurement constraints, and (vi) mechanism constraints (Vishnoi et al., 2019). As explained by the authors, there are several ways to alleviate these constraints, including research partnerships between the public and private sectors, reskilling and training the workforce, making them competent and machine experts and devising and implementing various methods for overcoming them (Vishnoi et al., 2019). They also argue that, while automation

deployment used to be considered a competitive advantage, it is now considered more of a necessary evil rather than a core competency (Vishnoi et al., 2019).

Ivančić et al. (2019) conduct a systematic literature review on robotic process automation, which can be defined as a new technology that focuses on automating repetitive, routine, rule-based human processes to benefit enterprises that choose to employ such software. Their paper summarizes three research issues on the state and progress of robotic process automation research, as well as its definition and practical application, which are discussed in further detail in the study; additionally, the study seeks to clarify the distinctions between robotic process automation and business process management (Ivančić et al., 2019). Ivančić et al. (2019) conclude that the perceived value of robotic process automation is mostly tied to organizational performance improvement and cost reduction through the elimination of human labour in normal business activities, as well as an increase in work quality. However, non-financial outcomes like as competence, market position, innovation, knowledge discovery, and research and development are also included, and, due to the possibility that the expenses of robotic process automation development and maintenance would outweigh the savings realized, business processes must be thoroughly examined to determine their eligibility for robotic process automation (Ivančić et al., 2019).

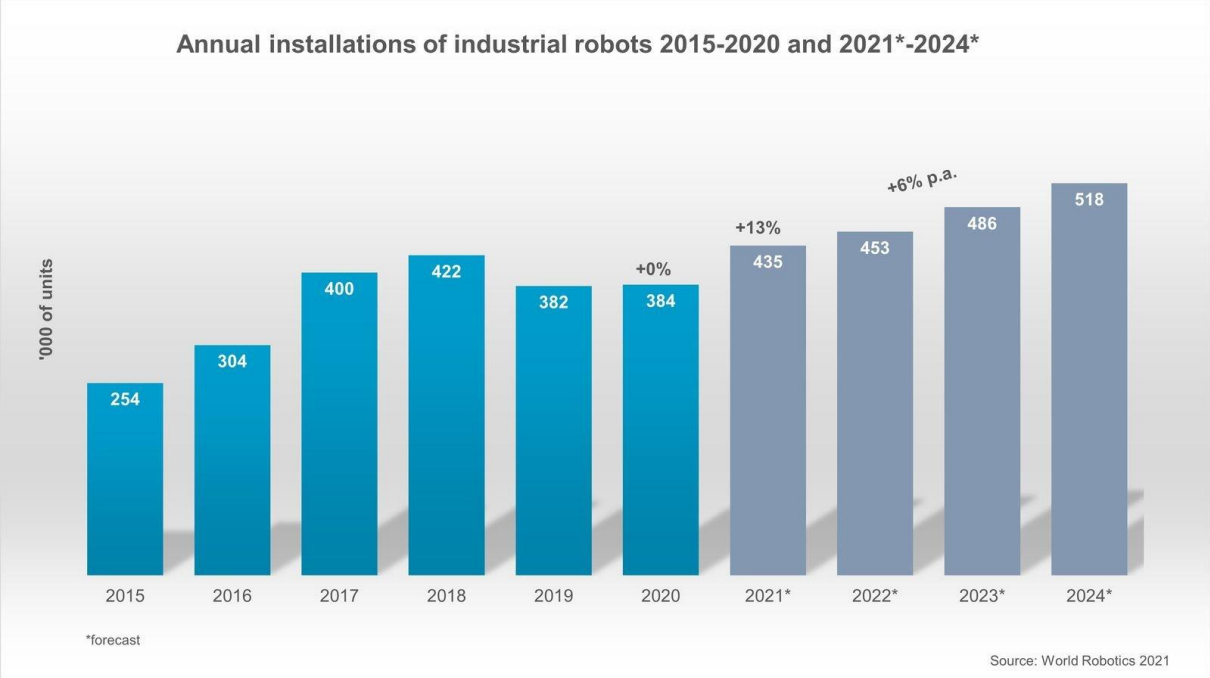
Coombs et al. (2020) conduct a scoping review of the current literature, which focuses on breadth rather that depth of coverage in the literature. The purpose of their study is to examine the potential consequences of intelligent automation by classifying artificial intelligence research on knowledge and service papers published between January 2011 and December 2017 (Coombs et al., 2020). As argued by the authors, the named study makes three significant additions to the body of knowledge: (i) they define intelligent automation and examine the technologies that make it possible, stating that such conceptualization is critical since academic and media sources frequently utilize conflicting terms when discussing knowledge automation and service jobs; (ii) they propose a business value-based model of intelligent automation for knowledge and service work, based on their analysis of the literature, and highlight twelve critical research gaps that impede a thorough understanding of the business value process; and (iii) they propose a research program to fill identified knowledge gaps (Coombs et al., 2020).

Finally, Coombs (2020) explain that, aiming to mitigate human resource shortages during the COVID-19 pandemic's heightened urgency, governments, healthcare providers, and companies are relying on artificial intelligence apps to substitute for the unavailability of human employees, which increased interest has re-ignited the debate over the use of artificial intelligence for the automation of employment, known as the intelligent automation. The question of whether COVID-19 will serve as a catalyst for increased intelligent automation use has taken on a new dimension, where there are both arguments in favor and against (Coombs, 2020). As explained by Coombs (2020), arguments in favor

of raising the amount of intelligent automation adoption in the era of COVID-19 include consumer preferences shifting in favor of intelligent automation, improved familiarity with intelligent automation technology, and increased company trust in intelligent automation, while the availability and reliability limits of big data, the fact that many jobs still favor human talents over intelligent automation, the limited capabilities of intelligent automation technologies, and the great availability of human employees are all counter-arguments against automation. In addition, Coombs (2020) analyzes the ramifications of the named argument for information management research and practice as well as for the public.

The research on robotics include three main areas: job replacement, human-robot collaboration, and learning opportunities (Vrontis et al., 2021). Robotics can be defined as a creation of robots that can mimic human behaviour and perform human movement (Vrontis et al., 2021). According to ISO, robot is "an automatically controlled, reprogrammable, multipurpose manipulator, programmable in three or more axes, which can be either fixed in place or mobile for use in industrial automation applications."

The World Robotics 2021 Industrial Robots report (IFR, 2021) shows increase of 10%in industrial operating robots in 2020, scoring at 3 million industrial robots worldwide. Figure 2 shows that sales of new robots grew slightly at 0.5%, with global shipment of 384,000 units in 2020. China is leading with 168,400 installed industrial robots in 2020, followed by Japan (38,700), United States (30,800), Republic of Korea (30,500) and Germany (22,300). The largest sector in 2020 is electronics with 109,000 installations in 2020, followed by automotive (80,000), metal and machinery (41,000), and plastic and chemical products (19,000). According to the IFR, the post-crisis boom is expected to fade in 2022, followed by the medium range growth rates.



Source: IFR, 2021[27]

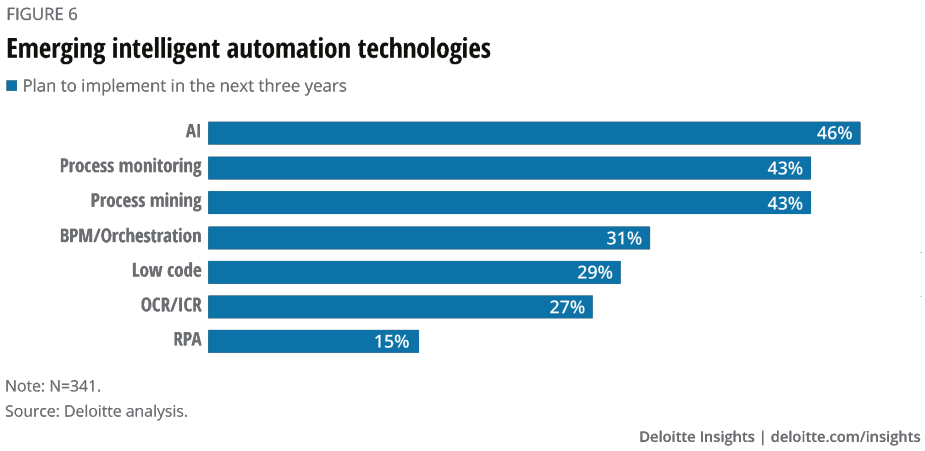
The market for professional service robots increased 12% in 2020, and reached a turnover of 6.7 billion USD (IFR, 2021). As shown in the previous figure, dominating sectors are transportation and logistics, professional cleaning, medical robotics, hospitality, and agriculture. The service robotics is developing rapidly, led by many innovations from start-up companies worldwide.

[27] https://ifr.org/ifr-press-releases/news/robot-sales-rise-again

Intelligent Automation Framework

The Intelligent Automation (IA) framework presented in this whitepaper is designed to guide organizations in their IA journey. It is based on four main strategic pillars: Invest, Experiment, Maintain, and Divest. Each of these pillars represents a different stage in the lifecycle of an IA initiative and provides a strategic approach to managing it.

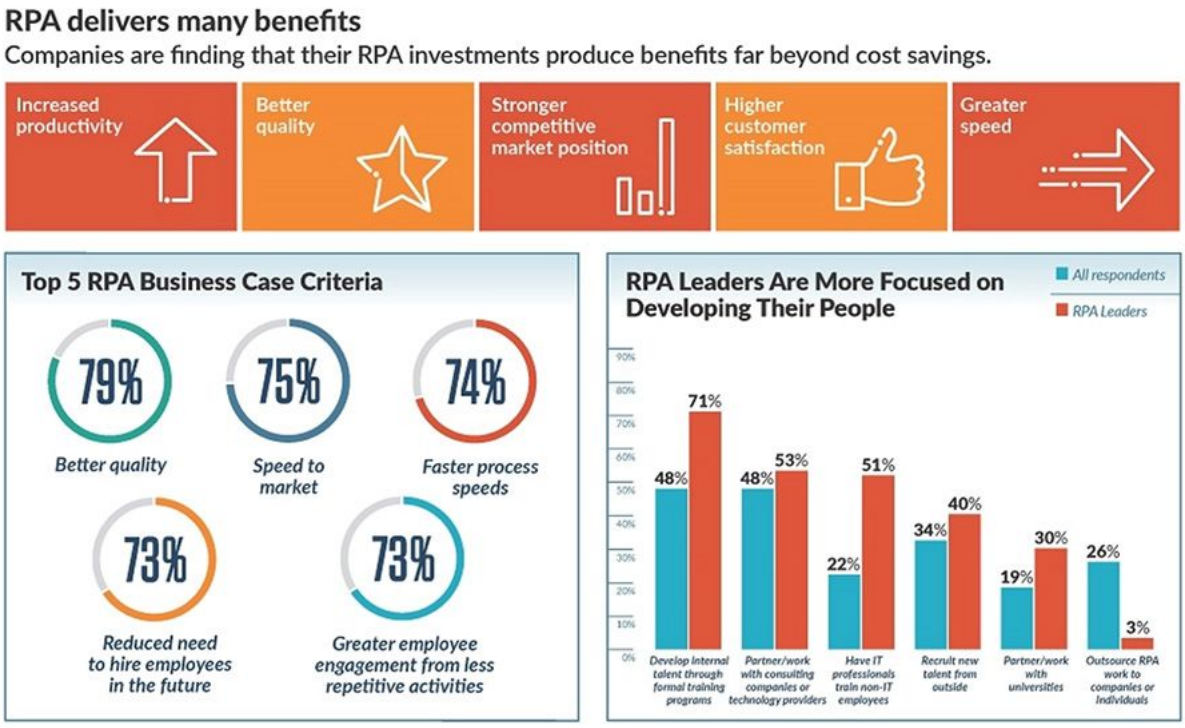
1. **Invest:** The first pillar of the IA framework involves identifying opportunities for automation within the organization and investing in the necessary technologies and resources. This could involve conducting a thorough analysis of business processes to identify areas where automation could drive efficiency and value. Investment also includes building the necessary infrastructure, acquiring the right tools and technologies, and training or hiring staff with the necessary skills.



Source: Deloitte, 2022[28]

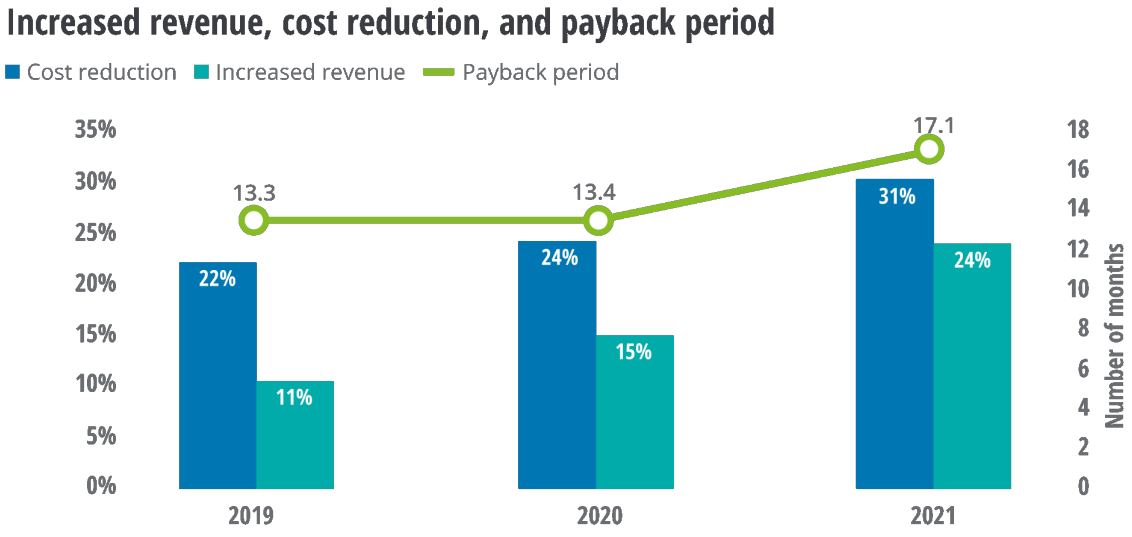
- Robotic Process Automation (RPA): Investment in RPA can lead to significant cost savings and efficiency improvements. The technology continually evolves, with advancements in intelligent optical character recognition (IOCR), chat-bots, machine learning, big data analytics, cognitive platforms, anomaly detection, pattern analysis, voice recognition, and data classification[29]. A Protiviti survey from 2019[30] found that RPA investment is growing, with average investment at $5 million and top spenders at $10-20 million. The survey polled 450 executives, 78% from $1B+ companies.

[28] https://www2.deloitte.com/us/en/insights/focus/technology-and-the-future-of-work/intelligent-automation-2022-survey-results.html
[29] https://www.hindawi.com/journals/jfq/2021/4535567/
[30] https://www.consulting.us/news/2445/companies-ramping-up-investments-in-robotic-process-automation



Source: Protiviti, 2019[31]

FIGURE 2



Notes: 2019: N=302; 2020: N=320; 2021-22: N=341.
Source: Deloitte analysis.

Deloitte Insights | deloitte.com/insights

Source: Deloitte, 2022[32]

[31] https://www.consulting.us/news/2445/companies-ramping-up-investments-in-robotic-process-automation
[32] https://www2.deloitte.com/us/en/insights/focus/technology-and-the-future-of-work/intelligent-automation-2022-survey-results.html

- Artificial Intelligence (AI): Investment in AI can significantly improve operational efficiency and decision-making capabilities. AI can automate complex tasks, analyze large volumes of data, and make predictions based on patterns in the data.

- Machine Learning (ML): Investment in ML can significantly improve predictive capabilities and decision-making. ML algorithms can learn from data and improve over time, making them ideal for tasks that involve pattern recognition, anomaly detection, and prediction.

- Natural Language Processing (NLP): Investment in NLP can significantly improve the ability to understand and generate human language. This can automate tasks such as customer service, document analysis, and sentiment analysis.

- Cognitive Automation: Investment in cognitive automation can significantly improve the ability to automate complex tasks that require human-like perception, judgment, and interaction.

2. **Experiment:** Once the investment has been made, the next step is experimenting with IA. This involves piloting IA initiatives, testing different tools and approaches, and learning from the outcomes. The experimentation phase is crucial for understanding IA's potential and limitations within the organization's specific context, as it can bring leverage to an investment already made.

    - The same technologies mentioned above are also being experimented with in various industries. For instance, AI and ML are used in the food industry to enhance operational efficiency and safety[33]. RPA is integrated with AI and Cloud to scale and interpret data[34].

    - McKinsey analysts[35] found that early adopters of artificial intelligence (AI) could see their cash flow double by 2030, with a cumulative increase of 122%. This means that the economic benefits of AI adoption will outweigh the costs by a significant margin.[36]

[33] https://www.hindawi.com/journals/jfq/2021/4535567/
[34] https://sciendo.com/article/10.2478/picbe-2018-0007
[35] https://www.mckinsey.com/featured-insights/artificial-intelligence/notes-from-the-ai-frontier-modeling-the-impact-of-ai-on-the-world-economy
[36] https://hbr.org/resources/pdfs/comm/CRE3021_HBR_WP_Autodesk_DM_August2022.pdf

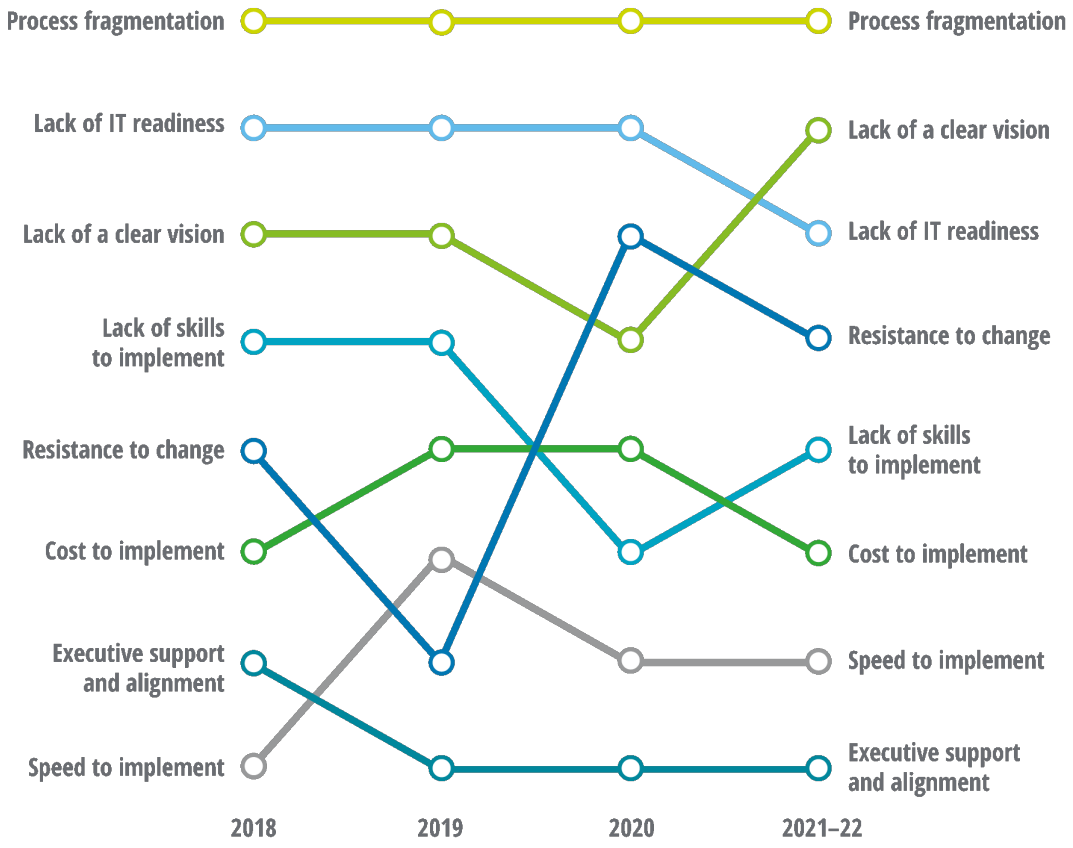
3. **Maintain:** After successful experiments, the focus shifts to maintaining and scaling the IA initiatives. This involves monitoring the performance of the IA systems, continuously improving them, and ensuring they deliver the expected value. It also includes managing any risks or challenges and ensuring the organization's IA capabilities remain aligned with its strategic objectives.

    - Maintenance of these technologies is crucial for their effective functioning. For example, the food industry uses AI and ML to handle food production and delivery processes efficiently. RPA automates processes and develops Centres of Excellence (CoE).

    - Maintaining a technology often refers to scaling it. There are, nonetheless barriers to the scaling process, particularly for evolving technology.

FIGURE 3

Barriers to scaling intelligent automation



Notes: 2018: N=478; 2019: N=302; 2020: N=320; 2021–22: N=341.
Source: Deloitte analysis.

Deloitte Insights | deloitte.com/insights

Source: Deloitte, 2022[37]

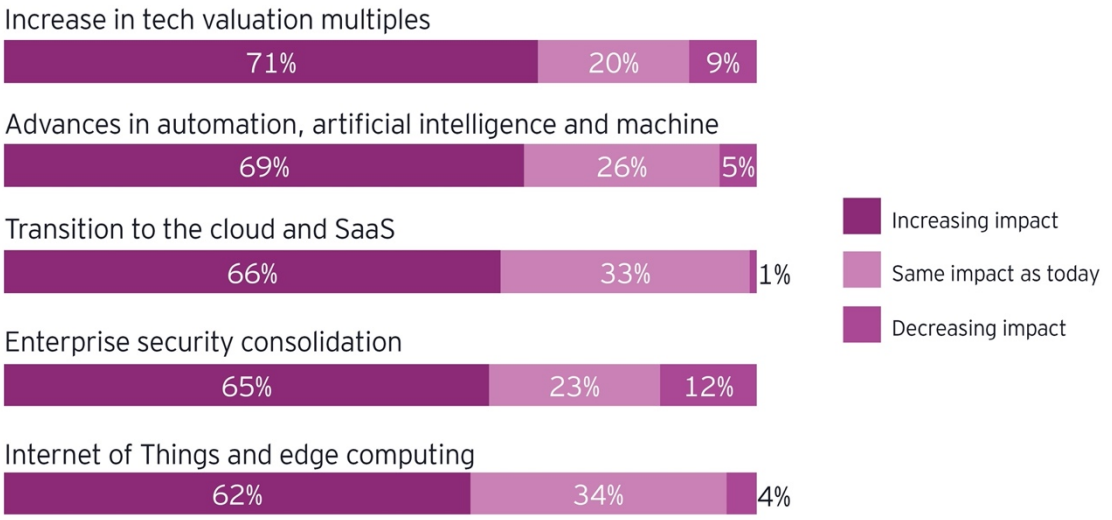
[37] https://www2.deloitte.com/us/en/insights/focus/technology-and-the-future-of-work/intelligent-automation-2022-survey-results.html

4. **Divest:** The final pillar of the IA framework is divestment. Not all IA initiatives will deliver the expected results or remain relevant as the organization and its environment evolve. The divestment stage involves identifying such initiatives and strategically withdrawing from them. This could involve reallocating resources to more promising areas or rethinking the approach to IA.

    - Divesting from these technologies should be done with caution. For instance, the Boeing 737 MAX disasters offer lessons on how AI systems should and shouldn't be implemented. Automated systems designed to improve safety may create dangers or cause harm when malfunctioning[38].

    - Companies may divest from specific technologies and invest in others, as per the reasons listed in a 2021 EY report.

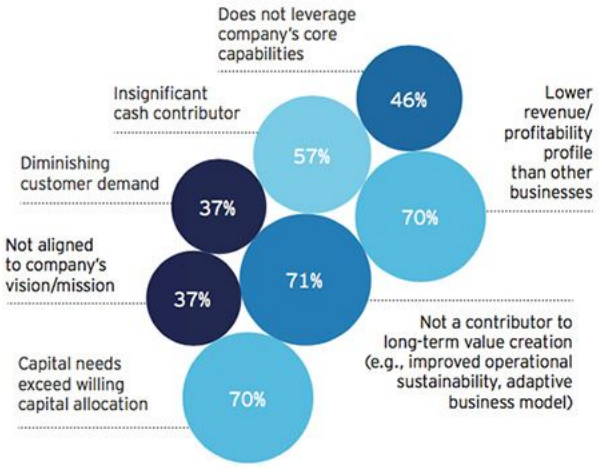
Q **What is the impact of the following trends on your divestment decisions over the next three years? (Select one.)**



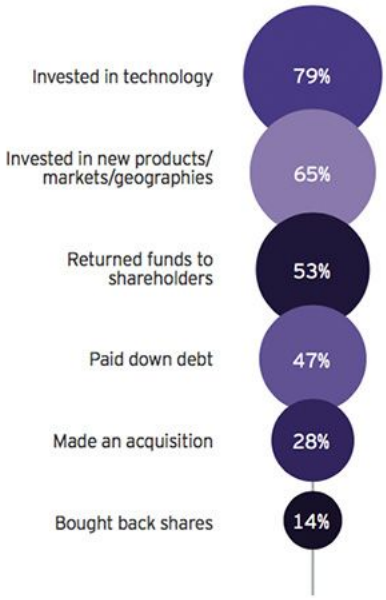
Source: EY, 2021[39]

[38] https://pubs.rsna.org/doi/10.1148/ryai.2020190111
[39] https://www.ey.com/en_au/divestment-study/technology

What factors do you use to identify non-core businesses/assets for divestments? (Select all that apply.)



What did you do with the funds raised from your most recent divestment? (Select all that apply.)



Source: EY, 2021[40]

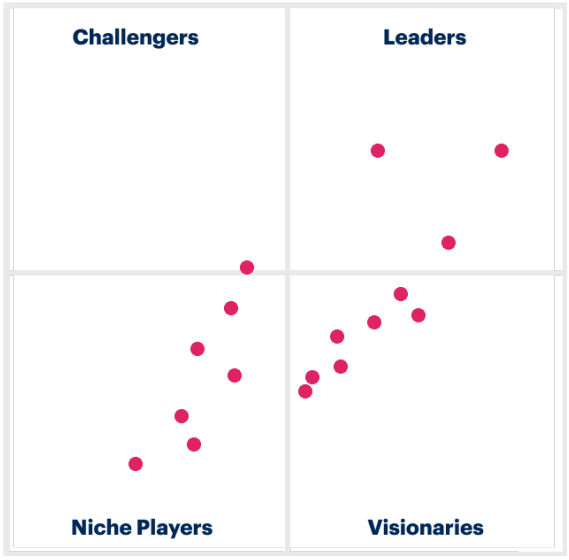
There are several reasons why an intelligent automation deployment may fail, as listed in a 2022 report by IBM[41].

Deploying automation in the dark	Too often organizations automate broken or poorly executed processes that yield few improvements. Knowing what and what not to automate is the first step to a successful automation plan. Process mining provides full transparency into how your end-to-end processes are actually operating. Data-backed insights derived from organization's information systems provide business and IT teams a shared view into process inefficiencies, bottlenecks, and deviations.
Not testing before implementation	It's important for an organization to analyze, plan, and prioritize before investing in business automation. Successful implementation requires extensive testing and simulations of revised business processes to help analyze possible bottlenecks and the impact of potential changes. Decisions and prioritization of change initiatives should be driven by ROI projections derived from what-if scenarios analysis/simulations.
Automating tasks rather than entire processes	Worker productivity generally improves when repetitive, mundane tasks are automated using tools like RPA. However, such gains often pale in comparison to those obtained by fully modernizing end-to-end employee and customer experiences. Rather than focusing on individual tasks, automation recommendations can identify automation low-hanging fruit and provide a holistic view of the process that includes insights from process mining, task mining, and decision mining.
Failing to iterate	Organizations that deploy process reengineering and automation without measuring impact and results typically fail to continuously optimize their processes. Post-deployment monitoring enables an organization to compare process performance against pre-defined key performance indicators (KPI) to ensure projects are operating at an optimal level. Lack of skills to scale automation
Lack of skills to scale automation	Today, talent availability is becoming the main adoption risk factor for most businesses that want to implement intelligent automation technologies. Employees with the right set of skills and expertise to work with tools like process mining and RPA are scarce. How can we help those automation builders focus on higher value work like planning and analysis?

[40] https://www.consultancy.asia/news/4217/7-in-10-asian-companies-plan-to-divest-portfolio-business
[41] https://newsroom.ibm.com/Five-Reasons-Why-Business-Automation-Initiatives-Fail-and-How-to-Avoid-Them

This IA framework provides a strategic roadmap for organizations embarking on their IA journey. By following these four pillars - Invest, Experiment, Maintain, and Divest - organizations can navigate the complexities of IA and harness its potential to drive innovation and growth.

For each pillar, an assessment of the market via Gartner's Magic Quadrant may be used. The Magic Quadrant is *"tool that provides a graphical competitive positioning of technology providers to help you make smart investment decisions. Thanks to a uniform set of evaluation criteria, a Magic Quadrant provides a view of the four types of technology providers in any given field: Leaders execute well against their current vision for changing market rules but do not yet execute well. Visionaries understand where the market is going or have a vision for changing market rules but do not yet execute well. Niche Players focus successfully on a small segment or are unfocused and do not out-innovate or outperform others. Challengers execute well today or may dominate a large segment but do not demonstrate an understanding of market direction."*

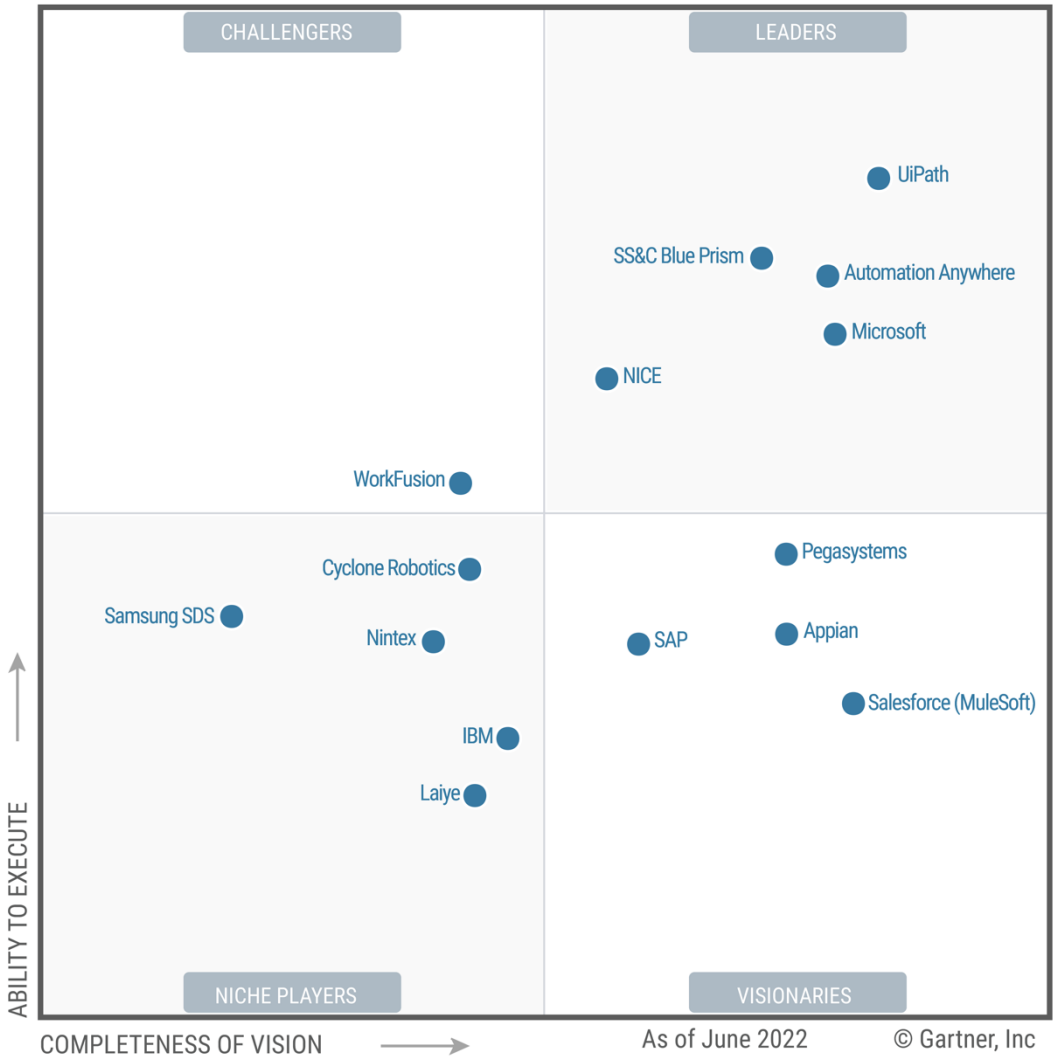


Source: Gartner, 2021[42]

For instance, for 2022, the Magic Quadrant for RPA looked like this:

[42] https://www.gartner.com/en/documents/4004033

Figure 1: Magic Quadrant for Robotic Process Automation



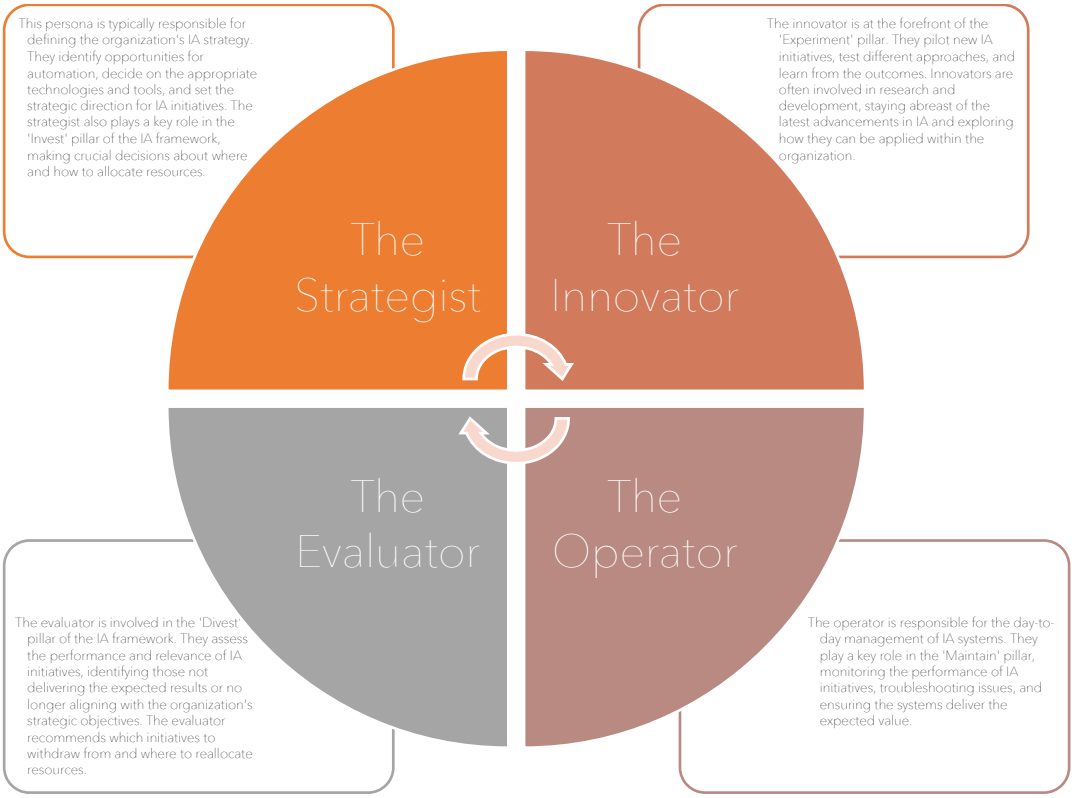
Source: Gartner (July 2022)

Source: Gartner, 2022[43]

[43] https://www.uipath.com/resources/automation-analyst-reports/gartner-magic-quadrant-robotic-process-automation

Work Personas in IA

As Intelligent Automation (IA) continues to evolve and reshape the business landscape, it is creating a new set of work personas. These personas represent different roles and responsibilities within the IA ecosystem, each playing a crucial part in successfully implementing and managing IA initiatives[44].



These work personas are not rigid categories but represent different roles that individuals may play at various stages of the IA lifecycle. In many cases, a single individual may take on multiple personas, depending on the organization's needs and the IA initiative's specific context.

Understanding these work personas can help organizations to effectively manage their IA initiatives, ensuring they have the right skills and expertise at each stage of the IA lifecycle.

[44] https://www.computerworld.com/article/3680230/how-intelligent-automation-will-change-the-way-we-work.html

Skills Map of IA Workers

The successful implementation and management of Intelligent Automation (IA) initiatives require a diverse set of skills. These skills can be broadly categorized into technical skills and soft skills, each of which plays a crucial role in different stages of the IA lifecycle[45][46][47].

Technical Skills

1. **Scripting**: This involves the ability to write scripts in languages such as Python, which are often used in automation tasks.
2. **Source-code management**: Familiarity with tools like Git for managing and tracking changes to source code is essential.
3. **Kubernetes**: Knowledge of Kubernetes, a platform for automating the deployment, scaling, and management of containerized applications, is increasingly important in the era of cloud computing.
4. **Security**: Understanding security principles and practices is crucial to protecting IA systems from threats.
5. **Testing**: Skills in testing methodologies and tools are needed to ensure the quality and reliability of IA systems.
6. **Observability and Monitoring**: The ability to monitor IA systems and observe their performance and behavior is key to maintaining their effectiveness and troubleshooting issues.
7. **Network awareness**: Understanding network principles and technologies is important for designing and implementing IA systems.
8. **Programming**: Proficiency in programming languages, such as Java or C#, is often required for developing and customizing IA solutions.
9. **Mechanical knowledge**: A basic understanding of mechanical principles may be required for certain roles, such as those involving robotics.

[45] https://www.redhat.com/sysadmin/8-skills-automation
[46] https://in.indeed.com/career-advice/finding-a-job/what-is-automation-engineering
[47] https://in.indeed.com/career-advice/resumes-cover-letters/automation-tester-resume

Soft Skills

1. **Communication**: Communicating effectively with different stakeholders is crucial in all stages of the IA lifecycle.
2. **Flexibility**: As IA is a rapidly evolving field, adapting to new technologies and approaches is key.
3. **Attention to detail**: IA initiatives often involve complex systems and processes, requiring high attention to detail.
4. **Teamwork**: IA initiatives typically involve cross-functional teams, requiring the ability to work effectively with others.
5. **Empathy**: Understanding and considering the human impact of IA initiatives is important, particularly concerning issues such as job displacement.
6. **Leadership**: For roles such as the Strategist and the Innovator, leadership skills are crucial for guiding teams and driving the strategic direction of IA initiatives.
7. **Innovation**: The ability to innovate and think creatively is key to identifying new opportunities for automation and developing effective solutions.

These skills are incomplete, and the required skills may vary depending on the role and the specific context of the IA initiative. However, they provide a broad framework for understanding the skills landscape of IA workers.

Insights on IA in Specific European Countries

IA in Belgium: Current state and future prospects

Everyone wants to get ahead. You do, your neighbour does and so do we. The need for social and economic progress is an integral part of the human condition. It is the common denominator that unites students, workers, pensioners and business leaders alike.

We all want better and affordable healthcare, solutions for climate change, more job opportunities, better purchasing power and even mundane things, like spending less time in traffic. We want our quality of life and that of our children to improve. Curiosity, innovation and developing new skills have always been our strengths. So, let's put them to good use .

You are using artificial intelligence (AI) right now: in your pocket, on your computer, even when you shop. Just think of your smartphone, telling you to leave for your next appointment because of traffic congestion, or of the translation tools we use when travelling. Think of the suggested TV-series when you scroll through your Netflix-account.

And this is just the start! The ways in which AI can change our lives for the better, reach beyond our wildest dreams. Thanks to AI, doctors are better equipped to predict and identify brain tumours. Restaurants can reduce waste by predicting customers' orders. Deaf children can follow classes with their peers through speech-to-text conversion. Your family home or a manufacturing company can cut down its energy consumption through better temperature control. Companies can develop more efficient renewable energy technology.

Belgium has launched a handful of policies regarding foreign investment in the Beligian Ai industry, hoping to draw more domestic investment from foreign technology companies.

In March of 2019, Belgium launched its national AI strategy, whose goal is enabling the Belgian people, private sector and academia to capture the opportunities of Ai.

Ai 4 Belgium states that " *it's time to be bold and ambitious, to come together, all of us, and to prepare our country for a future that is inevitably digital. We need to scale up local initiatives and put Belgium firmly on the map internationally.*" (AI4Belgium)

In order to position Belgium into the European and global landscape of Ai, Ai 4 Belgium brought together a multidisciplinary team of forty experts stemming from various institutional backgrounds, including Ai practitioners, academics and governmental representatives to formulate a **national Belgian Ai strategy**.

This strategy covers many aspects such as enhancing the competitiveness of companies through the use of artificial intelligence, the creation of a "new learning deal", creating networking between companies, research institutes and society. The strategy includes seven objectives for action:

1. Policy support on ethics, regulation, skills and competences.

2. Provide Belgian Ai cartography.

3. Co-animate Belgian Ai community.

4. Collect EU funding and connect EU ecosystems.

5. Propose concrete action for training in Ai.

6. Contribute to the uptake of Ai technologies by the industry.

7. Make new products and services based on Ai technologies emerge.

In AI4Belgium it is set out a **few implementation principles**, such as the need for overall ambition.

Set up a new learning deal – Technology and AI are transforming society and our job market. We currently lack both the capacity and tools to support this transition and our schools are not preparing the next generations for the 21st century. This is the reason why we propose a new learning deal; a universal skills building program for adults and more digital - as well as human - skills for our youth.

Develop a responsible data strategy – Trust is the cornerstone of any transformation. We believe in the need for a robust and up-to-date legal framework, ethical principles and more transparency. Moreover, data is the energy that will fuel the fourth industrial revolution. But data often remains inaccessible. We need to build a data ecosystem that facilitates more responsible data-sharing with reinforced open data policies, more collaborations and a platform with well-structured tools and approaches.

Support private sector AI adoption – It can be hard for companies, particularly SMEs, to start working with AI. It can be perceived as complex; companies might lack the internal resources and the iterative approach can be too costly. Hence, we propose to demystify AI through a lighthouse approach (training programs, large-scale events and social-impact projects). Secondly, we believe in more collaboration and accessibility to AI through a national AI hub. Lastly, we need to facilitate experimentation.

Innovate and radiate – We have world-class researchers, but our research is not at scale. Also, we have yet to develop, attract and retain enough AI talent. Lastly, it is hard for innovative start- up companies to grow beyond the early stages. Hence, we propose to position Belgium as Europe's AI lab through sandboxes and large-scale collaboration within academia, leveraging Belgian transposition of the GDPR. Next, we recommend creating more AI-related training programs, more focus on practical applications and more selective migration. Lastly, we suggest supporting the growth of our AI companies through an investment fund and by differentiating our expertise.

Improve public service and boost the ecosystem – Too few public organisations are currently experimenting with AI. Firstly, we propose that public institutions rethink their own roles and evolve towards a platform approach. Secondly, we need to give public institutions the tools to experiment; such as a rolling fund and more innovation-friendly procurement. Lastly, we recommend creating a Chief Digital Officer role to organise internal transformations and launch large-scale transversal projects.

A few principles to ensure a sustainable implementation: ensuring continued trust from the public, a European approach, collaboration between all stakeholders, a grass-roots/community-led approach, focus on specific areas (such as healthcare/life sciences) and, lastly, daring to be ambitious and audacious. This will require an **investment of at least EUR 1 billion by 2030.**

The Belgian government has decided to focus on improving the artificial intelligence community and carve out a substantial budget to fund the local Ai industry. Putting more funding and budgets into the Ai industry will not only boost the domestic Ai industry, but will also attract more foreign investors. Giving foreign investors a more favorable economy and policy environment can be the difference between IBM or Microsoft opening their next research office in Belgium vs Ireland.

Belgium's policy has already started bearing fruit. Belgium has drawn a handful of foreign investments from leading technology and manufacturing companies. Ernst and Young reported that in 2018 Belgium "had a record year for attracting **foreign direct investments**. A total of 278 foreign investment projects were initiated, representing a 29% increase on the previous year and creating an all-time high number of jobs (7,363)."

At the beginning of the 20th century Belgium had established itself as **one of the leading European auto industry centers** with famous and technically advanced brands investing in plants within their borders. Belgium is the sixth largest per capita producer of motor vehicles in the EU and was chosen by Toyota as the location for its European headquarters which employs over 2.700 Toyota workers.

Belgium's Ai initiative aims to help propel the auto industry to compete even more fiercely on a global scale. The government feels growing the auto industry within Belgium is vital for its industrial growth.

The automotive industry brings Belgium more opportunities for accessing world-class tech, gains more research funding and more foreign technicians will call Belgium home. The large workforce that automotive requires is an obvious attraction for a government seeking to boost their economy. The automotive industry is one of the major employers in Belgium. In 2007, the industry accounted for more than 100,000 jobs, including close to 25,000 in assembly plants alone, and even more today.

POLITICO's AI Summit Spotlight on Belgian AI | POLITICO Event

In 2016, the Belgium government published a "Code of Good Practices" to guide companies and institutions that wish to test autonomous vehicles in Belgium. This type of government assistance was some of the first of its kind for autonomous vehicles. Many municipalities and governments have been fearful and far from welcoming.

In March of 2018, the Traffic Code was amended to allow autonomous vehicles to be tested on Belgian roads, subject to government approval. Thanks to those favorable government policies, the Belgian automotive industry has been continually growing and attracting manufacturers from around the globe.

Moving back to the **general Belgian technology industry**, it is one composed of companies and start-ups that produce hardware and software not just for the top companies within Belgium markets, but now for companies all over the planet. These Belgian suppliers provide a wide range of services, from navigation software and systems, through predictive and AR technology, to drive lines, transmissions, brake, light and sound systems and more.

In addition to fostering the growth of Ai within the Belgian academic and industrial worlds, Belgium has started developing and **introducing Ai to public facilities.**

In June of 2016, **two Belgian hospitals added humanoid robots** to their reception desks. The humanoid robots have a screen on their chest and a round human-like head. They are capable of simple communication and accompanying patients to the correct department within the hospital. Belgium boasts that they are the first robots in the world to be used to greet people in a medical setting.

Belgium has become a major piece of the Ai industry in Europe. Belgium has a **strong ecosystem of technology labs** including; Elucidata laboratory, iCity, bru technology hub. Many of these labs have been accredited to provide services via Innovation Vouchers from the government and are very well funded.

These labs serve a critical role in the Belgian Ai industry. The labs keep creating new young engineers for the local Ai market, along with the data science community. They employ thousands of young engineers, many right out of school.

Belgium's focus on fostering their Ai community should help elevate their economy and allow them to compete for becoming one of the elite Ai countries, not just in Europe, but throughout the world.

belgium-invests-in-ai
Brussels loves AI - brussels-loves-ai
Why Brussels is the best place to open a European HQ for tech companies.

A recent report from EY shows that 2018 was an absolute record year for attracting foreign direct investments (FDI). A total of 278 foreign investment projects were initiated, representing a 29% increase on the previous year and creating an all-time high number of jobs (7,363). With this increase, Belgium is going against the European trend.

More than 1500 international companies' HQ are now already established in Brussels. The capital of Europe has everything a company needs: an open economy, business incentives and services, a strong infrastructure, and a talent pool of multilingual, highly skilled professionals in all sectors.

Being the world's 2nd most cosmopolitan city and located at the crossroads of Western European cultures, this is actually not very surprising.

Belgium has also essential assets regarding Artificial Intelligence (AI). It has a tradition of world-class AI researchers, some of whom were at the cradle of artificial intelligence. Additionally, Belgium ranks 9th in the "Digital Economy and Society Index" within the EU with a society that largely embraces AI as a novel and promising technology rather than a threat.

The Brussels Region had a pioneering role in AI since long before it became a buzzword, hosting, for instance, the first academic laboratory dedicated to AI in Europe at the University of Brussels. The most active research groups are The IRIDIA laboratory, The AI Experience Centre and The Machine learning Group

Belgian employees are among the leaders in the use of artificial intelligence in the workplace.

54% of employees are already confronted with artificial intelligence at work or expect this to happen in the next two years. The Belgians are also predominantly positive about the use of AI at work. More than six in ten say that AI has a positive effect on their productivity.

The Brussels Region also supports companies in their AI endeavours, both from innovation, technical, finance and a business point of view.

innoviris .brussels empowering research

Innoviris, the Brussels Region funding body, has been providing significant support to AI-related research and innovation, steadily ramping up its support programs in this field, with a dedicated budget of € 20M over the past 2 years. In particular, an AI call ("Team Up") aimed at fostering collaboration between academia and industry was launched in 2017. This program reflects the Brussels Region approach to AI development, which emphasises collaborative research and open innovation.

For the technical aspects, one can mention the leading role of **Sirris** Brussels, through its Elucidata laboratory, and of the Icity.Brussels technology hub, both co-funded by the Brussels Region and ERDF

The **finance.brussels group SRIB/GIMB** aims at providing financial support for the creation, reorganisation or expansion of private companies located in the region. In addition to investment, they support entrepreneurs in all phases of their company's development. BRUSTART provides financial solutions to young innovative companies that are in the launching or starting-up phase. It supports technological innovation through the seed-capital fund, which is directed towards spin-offs.

One other important aspect of the Brussels is their support for the Tech communities. The Region expects to continue building on the success of the Data Science Community, made of AI experts and practitioners.

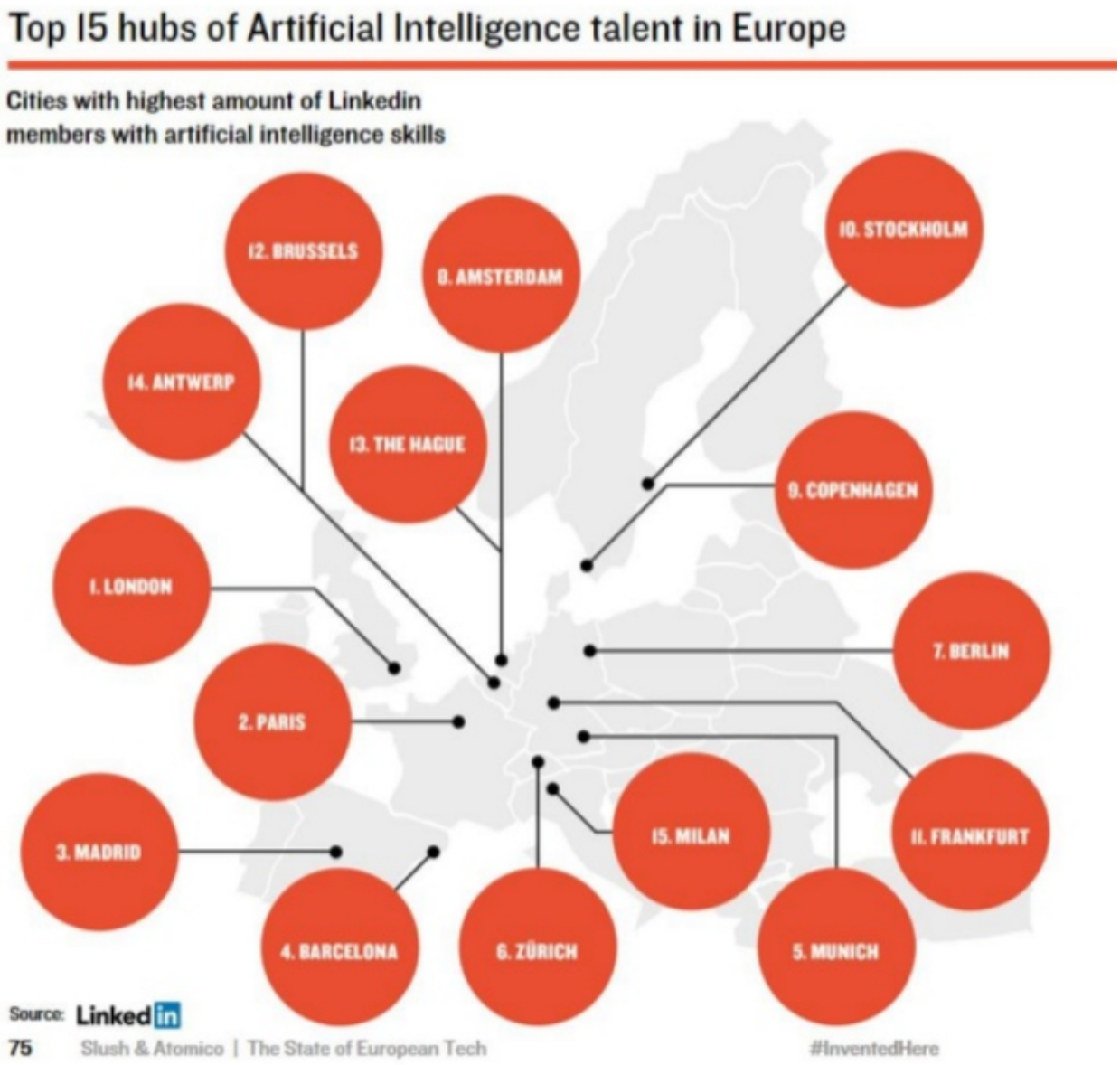
This community counts several thousand members and organizes more than a hundred events per year and one European Data Innovation Summit.

The region has co-financed a dedicated tech and starter Hub called DigitYser where communities can gather to boost their digital skills and raise awareness on AI and data literacy. DigitYser also is the regional driver of AI4Belgium the community-led approach to enable Belgian people and organisations to capture the opportunities of AI while facilitating the ongoing transition responsibly. AI 4 Belgium has the ambition to position Belgium in the European AI landscape. We are currently assisting the newly elected government to define their AI strategy based on the European recommendations.

More skills development is made possible with the development of **new training programs**, namely with the Microsoft AI School, the Big Data Bxl and AI Black Belt initiative.

3 tech hubs are promoting AI actively:

- Becentral – The digital campus of Brussels
- Betacowork – Coworking and Community for freelancers & entrepreneurs.
- DigitYser – The home of the AI & datascience community in Brussels



Brussels and Antwerp are in the top 15 hubs of artificial intelligence talent in Europe, according to a new report from the international venture capital firm Atomico. That is one of the conclusions in '[The State of European Tech]', a new report from venture firm Atomico and the Finnish tech conference Slush published in 2016. Atomico and Slush use LinkedIn data as a source for their conclusions. To be more precise: cities with the highest amount of LinkedIn members with AI skills.

Some examples of Belgian AI

Belgian AI startup Kwarts nabs €1.2 million to optimize customer journeys at scale

belgian-ai-startup-kwarts-nabs-e1-2-million

Belgian company Kwarts has won the trust of several investors for its AI-driven customer data platform

A-Inside, which mainly focuses on companies in life sciences. The round totals €1.2 million, and had the participation of Volta Ventures, Imec.istart, BlueHealth Innovation Fund, LRM, Belfius and experienced business angels Jean-Marie Vliegen, Wouter Reggers and Wim Van Cappellen.

The fresh funds will make it possible for Kwarts to recruit new data-minded talent.

Founded in 2016, Kwarts has recently developed 'A-Inside', an AI-driven customer data platform which helps companies to centralise and analyse data streams and thus map out the customer journey. It was created by CEO Bart Van Proeyen and CCO Ruben De Moor of Kwarts, who pivoted Kwarts' original consultancy role in order to develop the A-Inside platform.*"A major advantage is that our system can be integrated into an existing CRM system,"* explained CEO Bart Van Proeyen and CCO Ruben De Moor of Kwarts; *"We link data flows from the existing CRM and ERP system together with third-party data to our platform. A-Inside analyses the data and makes suggestions about customer needs. This is done in a very clear, workable way. We remove the silos between different teams within a company. In*

this way, A-Inside maps out the needs of customers such as care providers, and makes recommendations on how to meet their needs".

"The combination of industry experience, the scientific foundation as well as the co-created approach with customers strengthens our confidence in a successful go-to-market strategy for Kwarts," said Koen De Waele, Venture Partner at Volta Ventures. *"The A-Inside platform will seamlessly add intelligence and insight to existing CRM systems in the life sciences sector."*

The A-Inside platform was developed within the framework of a VLAIO project in cooperation with the BIARU cell at Hasselt University and is based on scientific research. Moreover, Bart and Ruben each have ten years of experience in life sciences. CEO Bart Van Proeyen explained: *"We approach the industry with expertise. Because of that background knowledge, there is an affinity for life sciences. Therefore, we work mainly with and for companies within the pharmaceutical and biotech sectors, both in Belgium and abroad. From our experience, we can come up with pragmatic solutions that work for our clients. But A-Inside is an agnostic platform, which means it can be perfectly implemented in other sectors".*

Kwarts has already completed projects in Europe and Asia, and has a trade mission to the US planned. To anticipate the expected growth, the company is expanding further. *"With the current seven-person team, we are very strong in the field of AI. We are now looking for strong profiles in software development and data science, on top of commercial profiles. Together with them, we want to make Kwarts grow further and become a household name,"* CCO Ruben De Moor of Kwarts concluded.

TVH Belgium – New storage and sortation system

tvh-belgium

TVH is a global player in the distribution of forklift trucks and the sales of spare parts. Viscon and TVH worked together on a solution for their warehouse location in Belgium. Their internal logistic processes have been optimized by using Viscon's intelligent automation solutions. Large amounts of crates in different sizes, filled with goods, are transported along low noise lines, and being sorted, stored and retrieved in an efficient manner.

Digital workplace - PROXIMUS The Workplace of Tomorrow

PROXIMUS_Digital_Workplace

Join the Next Normal

We work today more remotely. After Covid, we will work in a hybrid way, partly at home and partly in the office. Customers are also contacting us more via remote channels .By 2020, half of the workforce will be millennials.

As digital natives become a growing part of the workforce, the workplace must also become more digital.

How can you make your workplace suited for the next generation of workers?

- Make it **phygital**: the digital workplace is no longer a purely physical workplace but a combination of 'place' and virtual 'digital' applications.

- Fulfill expectations of digitally rooted employees by offering more info, more personalization, more automation and more flexibility.

- Adopt a digital workplace strategy supported by a top-notch technical implementation, sensible change management and ongoing support.

1. The Digital Workplace Sweet Spot

Your digital workplace isn't just about technology. People and processes are equally important.

Moving to the digital workplace is a delicate balancing act between:

- **Selecting the right technologies** for your organization
- **Getting people up to speed** on using the digital workplace properly
- **Adjusting the processes** and ways of working

2. Digital Employee Experience

44% of employees think their workspace isn't smart enough. A digital transformation of your workspace can greatly improve the satisfaction rate of your digital native employees.

It enables your company:

- Be **more productive**: less paper trail, faster HR support, more communication possibilities & smarter search functions
- Have **more engaged people**: flexible workspaces equal a better work life balance, higher work satisfaction and increased retention
- Be **more competitive**: faster knowledge sharing leads to less time-to-market and a competitive edge

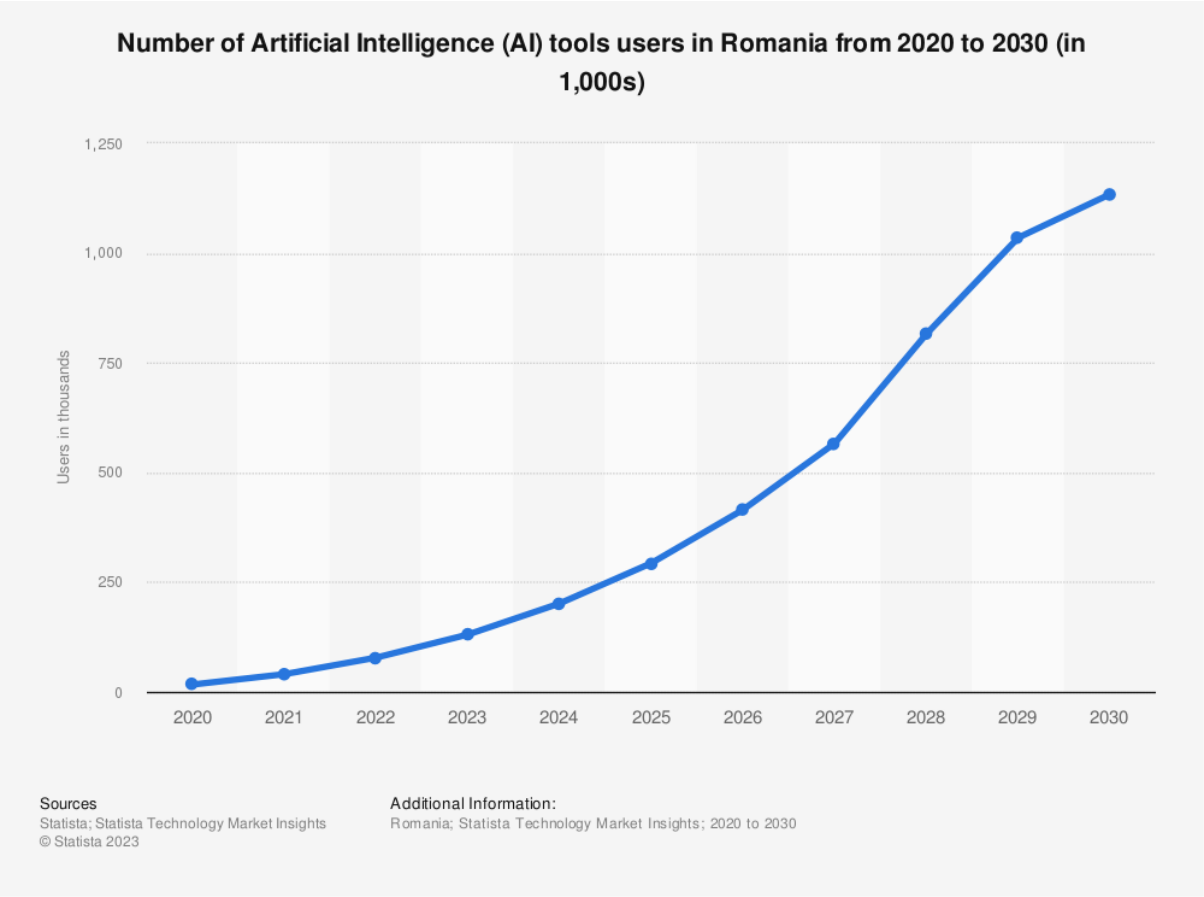
3. Smooth end-user adoption of your Digital Workplace

The road to a fully digitalized workplace may seem hard at first. But less so when a roadmap has been defined along well-defined objectives. A number of key elements to take into consideration are:

- **Employee productivity apps** give your employees fast access to services, programs and files from anywhere, at any time.
- **Embedded communication tools** greatly facilitate customer interactions.
- **Communication platforms** link your voice technologies with your IT capabilities.
- **Collaborative workspaces** is where the physical and digital come together (into the 'phygital').
- And finally, an end-**user adoption** plan is crucial to ensure that employees will actually use all digital workplace tools offered by their company.

IA in Romania: Current state and future prospects

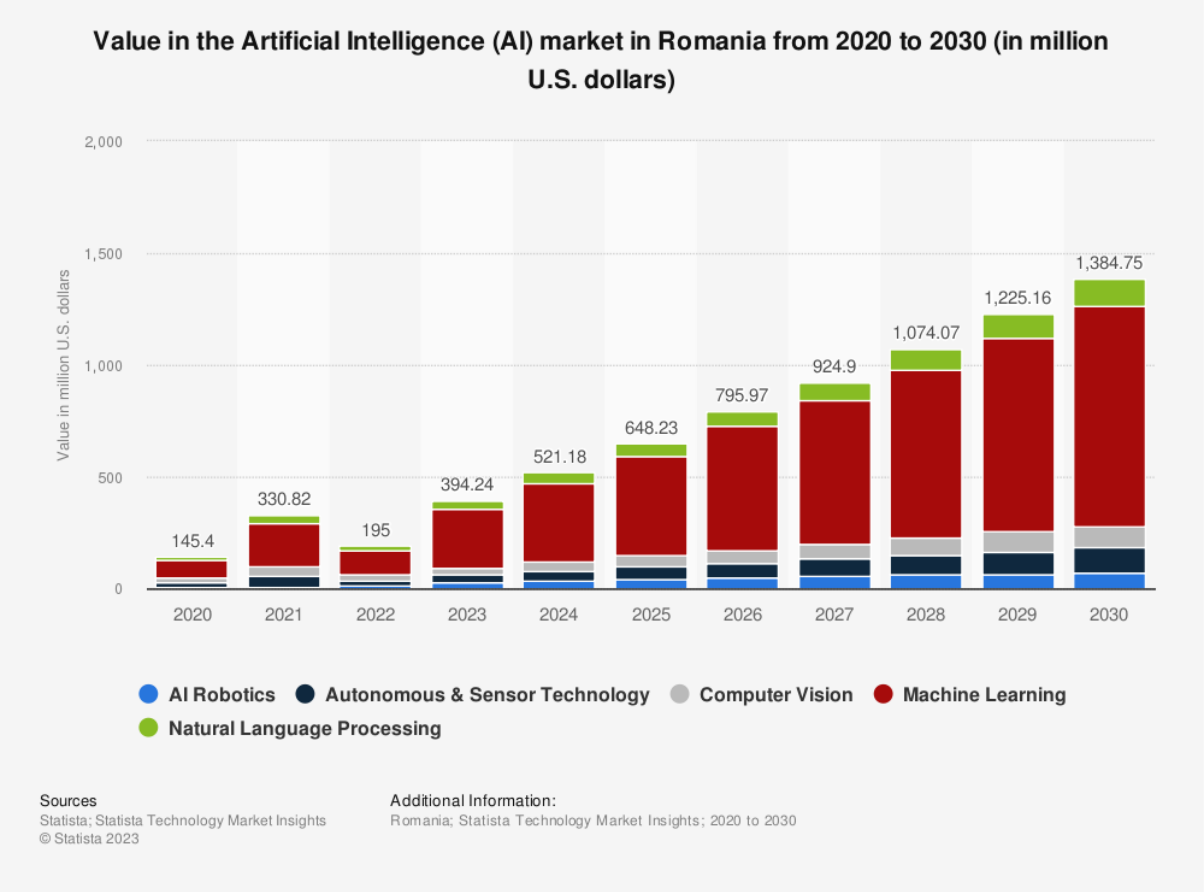
Romania is a paradoxical example of Intelligent automation market. Home of the largest unicorn in RPA, UiPath, the country is riddled with luddites[48]. Automation may affect the automotive and textile industries[49] (significant in the country's overall economy), with some 800.000 jobs lost, according to a 2017 report of the National Bank of Romania[50]. The trend of users of IA is expected to grow exponentially, from an estimated 77,890 users of AI tools in 2022 to a projected 1.1 million by 2030.



Source: Statista, 2023[51]

The value of the market is growing as well, from 195 million USD in 2022 (most of it in machine learning) to 1.4 billion USD forecasted for 2030.

[48] https://emerging-europe.com/news/romanias-luddites-push-back-against-automation/
[49] https://joint-research-centre.ec.europa.eu/system/files/2021-11/jrc126870.pdf
[50] https://www.bnr.ro/DocumentInformation.aspx?idDocument=28192&directLink=1
[51] https://www.statista.com/statistics/1401096/romania-ai-tools-users/



Source: Statista, 2023[52]

[52] https://www.statista.com/statistics/1401096/romania-ai-tools-users/

Innovation in IA: Flexibility, Resilience, and Foresight

The rapid evolution of Intelligent Automation (IA) is ushering in a new era of productivity and innovation. As IA applications set new standards of quality, efficiency, speed, and functionality, companies that successfully employ it may surpass competitors that do not. The key to this success lies in the innovative incorporation of three elements: flexibility, resilience, and foresight.

The Importance of These Three Elements in IA

1. **Flexibility**: Flexibility in IA refers to the ability of systems to adapt to changing circumstances and requirements. This is crucial in a rapidly evolving technological landscape, where the needs and demands of businesses can change quickly.

2. **Resilience**: Resilience in IA is the ability of systems to continue operating effectively in the face of disruptions or failures. This is particularly important in today's business environment, where organizations are increasingly reliant on technology and any disruption can have significant impacts.

3. **Foresight**: Foresight in IA is the ability to anticipate future trends and changes, and to adapt strategies and systems accordingly. This is key to staying ahead of the competition and ensuring that IA initiatives deliver long-term value.

Incorporating these elements into IA strategies involves a combination of technological, organizational, and strategic measures. Technologically, it involves using advanced IA technologies that can adapt to changing requirements and recover from disruptions. Organizationally, it involves creating a culture of innovation and learning where employees are encouraged to experiment with new ideas and approaches. Strategically, it involves closely monitoring technological and market trends and preparing to adjust IA strategies in response. Several companies have successfully incorporated flexibility, resilience, and foresight into their IA strategies.

" The factory of the future will have only two employees , a man and a dog. The man will be there to feed the dog. The dog will be there to keep the man from touching the equipment." Warren Bennis - adviser to Ronald Reagan and Jihn F. Kennedy)- the Remote Control CEO

Two-thirds of business leaders used automation for Covid-19 response — Deloitte

A study by Deloitte found that 68% of business leaders globally used automation to respond to the impact of Covid-19.

Distributed cloud, AI engineering, cybersecurity mesh and composable business drive some of the top trends for 2021.

When employees at an industrial site returned to the workplace after it was closed during the COVID-19 pandemic, they noticed a few differences. Sensors or RFID tags were used to determine whether employees were washing their hands regularly. Computer vision determined if employees were complying with mask protocol and speakers were used to warn people of protocol violations. What's more, this behavioral data was collected and analyzed by the organizations to influence how people behaved at work.

The collection and use of such data to drive behaviors is called the **Internet of Behavior (IoB).** As organizations improve not only the amount of data they capture, but also how they combine data from different sources and use that data, the IoB will continue to affect how organizations interact with people.

The IoB is one of Gartner's nine strategic technology trends that will enable the plasticity or flexibility that resilient businesses require in the significant upheaval driven by COVID-19 and the current economic state of the world.

The IoB is about using data to change behaviors

"The unprecedented socioeconomic challenges of 2020 demand the organizational plasticity to transform and compose the future," said Brian Burke, Research Vice President, during virtual Gartner IT Symposium/Xpo™ 2020.

This year's trends fall under three themes: **people centricity, location independence and resilient delivery.**

People centricity: Although the pandemic changed how many people work and interact with organizations, people are still at the center of all business. And they need digitaliized processes to function in today's environment.

Location independence: COVID-19 has shifted where employees, customers, suppliers and organizational ecosystems physically exist. Location independence requires a technology shift to support this new version of business.

Resilient delivery: Whether a pandemic or a recession, volatility exists in the world. Organizations that are prepared to pivot and adapt will weather all types of disruptions.

As always, these nine strategic technology trends do not operate independently of each other, but rather build on and reinforce each other. Combinatorial innovation is an overarching theme for these trends. Together they enable organizational plasticity that will help guide organizations in the next five to 10 years.

Trend 1: Internet of Behaviors

As demonstrated by the COVID-19 protocol monitoring example, the IoB is about using data to change behaviors. With an increase in technologies that gather the "digital dust" of daily life – data that spans the digital and physical worlds – that information can be used to influence behaviors through feedback loops.

For example, for commercial vehicles, telematics can monitor driving behaviors, from sudden braking to aggressive turns. Companies can then use that data to improve driver performance, routing and safety.

IoB does have ethical and societal implications depending on the goals and outcomes of individual uses

The IoB can gather, combine and process data from many sources including: Commercial customer data; citizen data processed by public-sector and government agencies; social media; public domain deployments of facial recognition; and location tracking. The increasing sophistication of the technology that processes this data has enabled this trend to grow.

IoB does have ethical and societal implications depending on the goals and outcomes of individual uses. The same wearables that health insurance companies use to track physical activities to reduce premiums could also be used to monitor grocery purchases; too many unhealthy items could increase premiums. Privacy laws, which vary from region to region, will greatly impact the adoption and scale of the IoB.

Trend 2: Total experience

Total experience combines multiexperience, customer experience, employee experience and user experience to transform the business outcome. The goal is to improve the overall experience where all of these pieces intersect, from technology to employees to customers and users. This trend enables organizations to capitalize on COVID-19 disruptors.

Tightly linking all of these experiences – as opposed to individually improving each one in a silo – differentiates a business from competitors in a way that is difficult to replicate, creating sustainable competitive advantage. This trend enables organizations to capitalize on COVID-19 disruptors including remote work, mobile, virtual and distributed customers.

For example, one telecommunications company transformed its entire customer experience in an effort to improve safety and satisfaction. First, it deployed an appointment system via an existing app. When customers arrived for their appointment and came within 75 feet of the store, they received two things: 1) A notification to guide them through the check-in process and 2) an alert letting them know how long it would be before they could safely enter the store and maintain social distance.

The company also adjusted its service to include more digital kiosks and enabled employees to use their own tablets to co-browse customers' devices without having to physically touch the hardware. The result was a safer, more seamless and integrated overall experience for customers and employees.

Trend 3: Privacy-enhancing computation

Privacy-enhancing computation features three technologies that protect data while it's being used. The first provides a trusted environment in which sensitive data can be processed or analyzed. The second performs processing and analytics in a decentralized manner. The third encrypts data and algorithms before processing or analytics.

This trend enables organizations to collaborate on research securely across regions and with competitors without sacrificing confidentiality. This approach is designed specifically for the increasing need to share data while maintaining privacy or security.

Trend 4: Distributed cloud

Distributed cloud is where cloud services are distributed to different physical locations, but the operation, governance and evolution remain the responsibility of the public cloud provider. Distributed cloud is the future of cloud.

Enabling organizations to have these services physically closer helps with low-latency scenarios, reduces data costs and helps accommodate laws that dictate data must remain in a specific geographical area. However, it also means that organizations still benefit from public cloud and aren't managing their own private cloud, which can be costly and complex. Distributed cloud is the future of cloud.

Trend 5: Anywhere operations

An anywhere operations model will be vital for businesses to emerge successfully from COVID-19. At its core, this operating model allows for business to be accessed, delivered and enabled anywhere – where customers, employers and business partners operate in physically remote environments.

The model for anywhere operations is "digital first, remote first;" for example, banks that are mobile-only, but handle everything from transferring funds to opening accounts with no physical interaction. Digital should be the default at all times. That's not to say physical space

doesn't have its place, but it should be digitally enhanced, for example, contactless check-out at a physical store, regardless of whether its physical or digital capabilities should be seamlessly delivered.

Trend 6: Cybersecurity mesh

Cybersecurity mesh is a distributed architectural approach to scalable, flexible and reliable cybersecurity control. Many assets now exist outside of the traditional security perimeter. Cybersecurity mesh essentially allows for the security perimeter to be defined around the identity of a person or thing. It enables a more modular, responsive security approach by centralizing policy orchestration and distributing policy enforcement. As perimeter protection becomes less meaningful, the security approach of a "walled city" must evolve to current needs.

Trend 7: Intelligent composable business

An intelligent composable business is one that can adapt and fundamentally rearrange itself based on a current situation. As organizations accelerate digital business strategy to drive faster digital transformation, they need to be agile and make quick business decisions informed by currently available data.

To successfully do this, organizations must enable better access to information, augment that information with better insight and have the ability to respond quickly to the implications of that insight. This will also include increasing autonomy and democratization across the organization, enabling parts of the businesses to quickly react instead of being bogged down by inefficient processes.

Trend 8: AI engineering

A robust AI engineering strategy will facilitate the performance, scalability, interpretability and reliability of AI models while delivering the full value of AI investments. AI projects often face issues with maintainability, scalability and governance, which makes them a challenge for most organizations.

Read more: 2 Megatrends Dominate the Gartner Hype Cycle for Artificial Intelligence, 2020

AI engineering offers a pathway, making AI a part of the mainstream DevOps process rather than a set of specialized and isolated projects. It brings together various disciplines to tame

the AI hype while providing a clearer path to value when operationalizing the combination of multiple AI techniques. Due to the governance aspect of AI engineering, responsible AI is emerging to deal with trust, transparency, ethics, fairness, interpretability and compliance issues. It is the operationalization of AI accountability.

Trend 9: Hyperautomation

Hyperautomation is the idea that anything that can be automated in an organization should be automated. Hyperautomation is driven by organizations having legacy business processes that are not streamlined, creating immensely expensive and extensive issues for organizations.

Many organizations are supported by a "patchwork" of technologies that are not lean, optimized, connected, clean or explicit. At the same time, the acceleration of digital business requires efficiency, speed and democratization. Organizations that don't focus on efficiency, efficacy and business agility will be left behind.

The COVID-19 pandemic made everyone question their business models. A majority of organizations weren't equipped to face the challenges brought on by the pandemic, such as remote working. However, with time, businesses started to control the situation by leveraging automation technologies, artificial intelligence, and machine learning tools. As a result, we see the following **automation trends around the world.**

Hyperautomation to Become Inevitable in the Market

For the past couple of years, Hyperautomation has been gaining a lot of attention. It is an advanced type of automation that completes processes and tasks at increased speed, with fewer errors, and it does so by combining automation tools with several packaged software and machine learning applications. Based on the current data, we predict that automation's scope will shift towards automating knowledge work from rigid and static rule-based distinct transactions and tasks. However, this will require a new automation strategy focused on digital process optimization from IT infrastructure using customer-facing applications. Hyperautomation brings integration, management, monitoring, and DevOps together on the same page allowing a full life-cycle of automated processes and enables businesses to automate end-to-end workflows managing complex support across different platforms.

Hybrid Digital Infrastructure Management

The practice of assessing and monitoring all the IT infrastructure, including networks, servers, and storage within an organization, is called Hybrid Digital Infrastructure Management (HDIM). As IT systems are becoming increasingly complex, a platform that allows the management of workloads, resources, and processes across distributed and diverse environments is becoming integral for IT teams. By the end of next year, around 20% of enterprises will use HDIM systems to some extent for optimizing workload over the edge, on-premises, and cloud environments.

Acceleration of Collaborative Automation

The collaboration between humans and robots at the workplace is inevitable in the future, and in 2021, we'll see a rise in collaborative automation. Humans will work together with automation technologies, computers, and software. Artificial Intelligence (AI) has already become a part of our daily lives, and unlike the concerns of some people, it is not here to take over humans. Sure, intelligent automation has the potential to replace humans, but that's not the intent of it; it is supposed to improve the way humans work. So in this context, companies will implement the highest levels of automation technologies to perform repetitive work and menial tasks to free up employees to focus on more integral tasks.

Heightened Adoption of Automation

Due to the alleged human replacement factor, automation wasn't the priority of the leaders. Due to the COVID outbreak, however, things have changed. Business and leaders are now more inclined towards integrating automation technologies to prevent the business processes from collapsing. Due to disrupted business workflows and the cash crunch it creates, companies worldwide are laying off employees in large numbers. To prevent further damage, businesses are turning towards automation tools and process automation to ensure business continuity. A more hostile demand for automating the business process will erupt in 2021 as countries and organizations grappling from an economic downturn are looking for a solution to alleviate themselves from this uncertainty.

Democratization of Automation

Automation technologies like robotic process automation (RPA), machine learning (ML), and artificial intelligence (AI) were already becoming important, but due to the pandemic,

they became essential. In 2021, we'll see the digital transformation at its peak as the concept of democratization of automation is becoming a reality. Effective automation strategies need extensive human support and participation, so with democratization, companies will be able to empower non-tech users and automate mundane tasks. Every new approach has its own set of challenges, and automation's democratization is no exception. Businesses, however, can address these challenges by developing and implementing a systematic automation strategy.

Automation Fragmentation

The automation market is becoming increasingly fragmented due to the escalating numbers of vendors providing automation solutions. Although this provides a broader choice for the people, it also creates challenges for choosing the right automation tools. This creates more frustration and confusion for businesses seeking to improve their automation coverage or invest in new tools. So it is indispensable for businesses to implement a bulletproof automation strategy to navigate this challenge and choose the right automation tools according to their business needs.

The Arrival of Intelligent Process Automation (IPA)

Businesses were already benefiting from artificial intelligence (AI) capabilities, but in 2021, they'll experience the full benefits. Using AI, this new capability will significantly patch the robotic process automation (RPA) called Intelligent Process Automation (IPA). Which is a collection of different technologies that work collaboratively to automate, integrate, and manage digital processes. It also combines fundamental process redesign and machine learning with RPA, enabling it to improve and learn over time. In 2021, the RPA adoption will grow significantly, and the IPA market will become even more viable. According to estimates, in a short span of five years, IPA investments and investments in other similar automation technologies will reach $232 billion, and a large scale adoption is expected across several industries.

New AI-Influenced Robotics Applications

AI-based solutions were already making headway into manufacturing and automation. In 2021, AI will significantly reduce failure and mechanical issues by analyzing data and sniffing out patterns using advanced sensor technology and more connected systems. The analyzed data will serve as fuel for predictive applications that use AI to detect patterns and direct a

robot about required maintenance. Such applications can automatically alert and guide engineers about the steps they need to take to repair a piece of equipment before breaking down, saving businesses from costly downtime.

Growth of Cloud Automation

Process automation may seem like it's only about technology, but it is actually more about digital transformation strategy. Organizations moving towards cloud-based data centers for data management can use cloud automation as it is the best choice for them. Organizations can enhance employee experience by easily accessing the data from cloud infrastructures using a cloud automation system. Cloud automation requires specialized tools and expertise as it is not built directly into the cloud. This automation technology is publically available from vendors including Azure, AWS, etc.

2020 caused a major shift in how business and IT teams operate. Gartner expects this disruption to cause a permanent shift in technology over the next four years, impacting IT automation strategies.

Each year, Gartner, Inc. releases a series of papers explaining the trends that will impact business, IT, and technology in the coming years. This year's predictions range from the novel (like neuromorphic computing) to the more expected (such as enterprise cloud strategies).

In general, most of Gartner's 2021 predictions involve IT's role becoming more prominent within the organization as digital business initiatives accelerate. So to help IT professionals plan for the coming year, we've gone through the latest Gartner research publications and pulled out the predictions most relevant to the IT automation market.

Overall, three major trends stick out:

- **An increase in overall data and data diversity will drive organizations toward new compute and storage technologies.**
- **The pace of automation is accelerating, with more organizations creating fully automated value chains.**
- **CIOs and other technology leadership positions are evolving into customer experience and operations positions.**

IT Automation Predictions for 2021

- *By year-end 2025, over half of the world's population will be subject to at least one internet of behaviors (IoB) program (private, commercial or governmental).*
- *By 2025, 40% of physical experience-based businesses will improve financial results and outperform competitors by extending into paid virtual experiences.*
- *By 2024, organizations with IT teams that understand the needs of customers will outperform other organizations' customer experience metrics by 20%.*
- *By 2023, 40% of all enterprise workloads will be deployed in cloud infrastructure and platform services, up from 20% in 2020.*
- *Through 2024, enhancements in analytics and automatic remediation capabilities will refocus 30% of IT operations efforts, from support to continuous engineering*.
- *By 2023, 40% of product and platform teams will use AIOps for automated change risk analysis in DevOps pipelines, reducing unplanned downtime by 20%.*
- *Gartner expects over 75% of large enterprises in mature economies will use container management by 2024 due to a growing adoption of cloud-native applications and infrastructure.*
- *By 2025, 50% of enterprises will have devised artificial intelligence (AI) orchestration platforms to operationalize AI, up from fewer than 10% in 2020.*

Gartner split its 2021 predictions into three themes: customer centricity, geographic independence, and operational resiliency. The overarching trend being that digital-first initiatives are accelerating – largely in response to the COVID-19 crisis. Due to the crisis, organizations have had to re-envision traditional processes for the virtual realm. Businesses that rely on physical experiences, including amusement parks, sports venues, and museums, are moving toward virtual experiences that provide new business value and additional revenue streams.

Organizations across industries – from financial services to retail, healthcare to education – are leveraging new tools and technologies to provide new, virtual services. The race is now on to improve the customer experience by creating new digital processes that optimize those services. Data, artificial intelligence, cloud services, and the internet of things (IoT) will provide a foundation for emerging digital technologies organizations will need to maintain competitive advantage.

This year, Gartner introduced the term **internet of behaviors (IoB).** IoB programs rely on data collection and IoT to make intelligent decisions that impact customer behavior. A classic example of IoB would be an auto insurance company determining rates according to how a customer drives. The goal is to adjust the customer experience at the individual level, offering a level of service that benefits both the customer and the enterprise.

To make these new services possible, IT teams are moving more workloads to cloud environments, deploying new tools, and playing an increasingly critical role in day-to-day operations.

Preparing For The "Digital Wall"

- *By 2025, traditional computing technologies will hit a digital wall, forcing the shift to new computing paradigms such as* ***neuromorphic computing****.*
- *By 2024, 30% of digital businesses will mandate DNA storage trials, addressing the exponential growth of data poised to overwhelm existing storage technology.*
- *Through 2030, a wide range of new computing and storage technologies will continue to deliver improved digital capabilities and price points. Examples include glass storage, DNA storage, chemical computing, nanotube computing and memristors.*
- *By 2024, 75% of organizations will have deployed multiple data hubs to drive mission-critical data and analytics sharing and governance.*
- *By 2025, AI will be the top category driving infrastructure decisions, due to the maturation of the AI market, resulting in a tenfold growth in compute requirements.*

The volume of data being created continues to rise exponentially. Data is a critical asset for organizations, providing a foundation for digital services, AI, natural language processing (NLP), deep neural networks, and much more. These technologies are also compute-intensive. Organizations are reaching a point where their data storage and computing are unable to keep up with the growth of data and technological advancements.

This is what Gartner has termed the **"digital wall".** In order to keep pace with competitors and market demands, organizations will begin to test emerging storage and compute technologies, including DNA storage, glass storage, neuromorphic computing, and extreme parallelism.

The challenge for IT teams over the next two to three years is how to integrate new technologies and reliably manage big data across disparate environments.

Hyperautomation Is Here To Stay

- *By 2025, customers will be the first humans to touch more than 20% of all products and produce.*
- *By 2024, organizations will lower operational costs by 30% by combining hyperautomation technologies with redesigned operational processes.*
- *By 2024, 80% of hyperautomation offerings will have limited industry-specific depth mandating additional investment for IP, curated data, architecture, integration and development.*
- *By 2024, more than 70% of the large global enterprises will have over 70 concurrent hyperautomation initiatives mandating governance or facing significant instability.*

Hyperautomation was first included in Gartner's 2020 predictions. Much of what was said then has changed now, if only because organizations are accelerating their **automation strategies** in response to the COVID-19 crisis.

Two key factors converge here:

1. **The economic uncertainty of 2020 has led organizations to reduce spending and to focus on operational efficiency.**
2. **Despite overall spending cuts, spending for digital transformation has actually increased as organizations rapidly adapt their workflows, services, and business models.**

The result is that organizations are leveraging AI and machine learning to automate as much as feasibly possible. By automating, organizations can reduce human error and make processes more efficient by removing human interventions and delays. Overall, automating processes end-to-end means fewer resources are needed to successfully complete the process, a boon for organizations that need to reduce operating costs while simultaneously providing faster services.

As we mentioned, hyperautomation isn't new – many organizations had hyperautomation initiatives in 2020. As more organizations move toward digital-first initiatives, the volumes of processes and data IT teams must manage continue to surge, making it difficult for IT teams to stay afloat. By rapidly automating, IT teams are able to achieve much more without

requiring more resources. The difference between 2020 and 2021 is that for 2021 and beyond, hyperautomation is accelerating.

By 2025, more than 20% of all products will be manufactured, packed, shipped, and delivered without being touched – the person who purchases the product will be the first person to touch it. The fully automated value chain is a result of hyperautomation. As organizations automate more and more tasks, those tasks are being organized into end-to-end processes that are more efficient, more reliable, more scalable, and easier to adapt.

Technological progress is helping to drive **hyperautomation** as well: Gartner expects that by 2023, organizations will be able to run a full 25% more tasks autonomously. While much of this will be achieved through the use of **robotic process automation** (RPA) in front-end offices, critical operations, infrastructure, and data processes will need to be automated with more robust orchestration and automation tools that provide programmatic integrations and deeper functionality.

The Role Of The CIO (Chief Information Officer) Is Evolving

- *By 2025, one in 10 technology leaders will find themselves the de facto leader of customer experience for their organization.*
- *By 2024, 25% of traditional large enterprise CIOs will be held accountable for digital business operational results, effectively becoming "**COO by proxy**."*
- *By 2022, 70% of customer experience projects will make use of information technology.*

The future of the business runs through the IT department. Most organizations seem to recognize this. As business models shift toward digital-first processes and services, IT is playing an increasingly critical role in day-to-day operations. This is having an impact on how the organization regards IT.

Because IT services have become central to the success of the business, business leaders are asking IT teams – and especially IT leaders – to play a larger role in devising long-term business strategies. Part of this change means that CIOs are taking on new responsibilities. This includes conferring digital knowledge to other executives in the organization, taking leadership over **digital business** operations, and playing a direct role in designing and implementing customer experiences.

This change can be a two-way road, however: while the CIO is becoming more closely aligned with the business, the COO is becoming more closely aligned with IT. This makes

IT, and the organization's **digital infrastructure**, inseparable from day-to-day operations and five-year plans.

This will increase pressure on IT. No longer will it be enough to play a supporting role in the organization, IT teams will be responsible for business outcomes.

As IT leaders take on new roles within the organization, composable infrastructure and services will become necessary in order to quickly adapt to evolving business needs.

Gartner lists four principles for creating a **composable business**:

- **Modularity**
- **Autonomy**
- **Orchestration**
- **Discovery**

In order to rapidly pivot to meet new challenges, crises, and trends, IT teams will need the ability to rapidly integrate, orchestrate, and deploy new processes and services. This will require intelligent automation software and process orchestration.

"Composable business is a natural acceleration of the digital business that you live every day. It allows us to deliver… real-time adaptability and resilience in the face of uncertainty."Gartner Keynote: The Future of Business Is Composable

Other Notable Predictions

Gartner has released over two dozen papers related to 2021 technology trends. Many of these other predictions are related to IT automation, but aren't exactly central to Gartner's main themes for 2021. This includes cloud computing.

Over the next few years, Gartner expects cloud to continue to evolve as more organizations move toward distributed, hyperscale, and hybrid cloud options. This will increase complexity for IT environments, requiring IT to streamline the provisioning of cloud-based resources as well as configuration management.

- *By 2025, more than 50% of organizations will use a distributed cloud option at the location of their choice, enabling transformational business models.*
- *By year-end 2023, 20% of installed edge computing platforms will be delivered and managed by hyperscale cloud providers, compared to less than 1% in 2020.*

- *Gartner expects over 75% of large enterprises in mature economies will use container management by 2024 due to a growing adoption of cloud-native applications and infrastructure.*

- *By 2024, 75% of organizations monitoring IaaS/PaaS environments will consume metrics via cloud providers' APIs.*

While IT might be getting busier, it's also becoming more efficient through process optimization.

- *Through 2024, enhancements in digital workplace infrastructure processes driven by analytics and automatic remediation capabilities will refocus 30% of IT operations management, from support to continuous engineering.*

- *By 2024, endpoint analytics and automation will help digital workplace service staff shift 30% of time spent on endpoint support and repair to continuous engineering.*

- *By 2023, 40% of product and platform teams will use AIOps for automated change risk analysis in DevOps pipelines, reducing unplanned downtime by 20%.*

- *76% of survey respondents say that demand for new digital products and services increased in 2020. Even more respondents (83%) say that it will increase in 2021.*

The next wave of automation -Robotic Process Automation (RPA)

Robotic Process Automation (RPA) has been hyped enormously in the past few years giving birth to several unicorns. RPA can be best described as the old excel-macro on steroids, relentlessly executing repetitive macros across not just one but several applications.

A typical use-case is to type information received in a web form into the database of an ERP system. RPA manages to automate many such low value-adding tasks that are based on repetitive tasks, with structured input and fixed rules.

RPA is one of the more advanced forms of classic automation described earlier. Yet, it doesn't learn from its mistakes and it can't handle exceptions it hasn't been programmed to deal with. The focus of RPA is more on input/output between systems, via screen scraping and mouse/keyboard automation, and less about the actual content itself. Intelligent automation is focused more on the heavy lifting of the actual content.

Typical shortcomings and drawbacks of RPA are:

- No solution for semi-or unstructured content

- No solution if rules are somewhat ambiguous
- Screen scraping and emulation is not future-proof and breaks easily

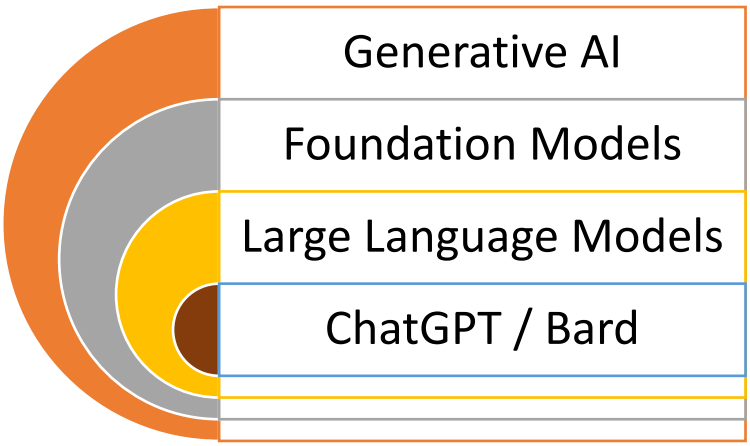
Peter Walker, CTO EMEA at Blue Prism, provides four intelligent automation trends that are set to shape real world operations this year.

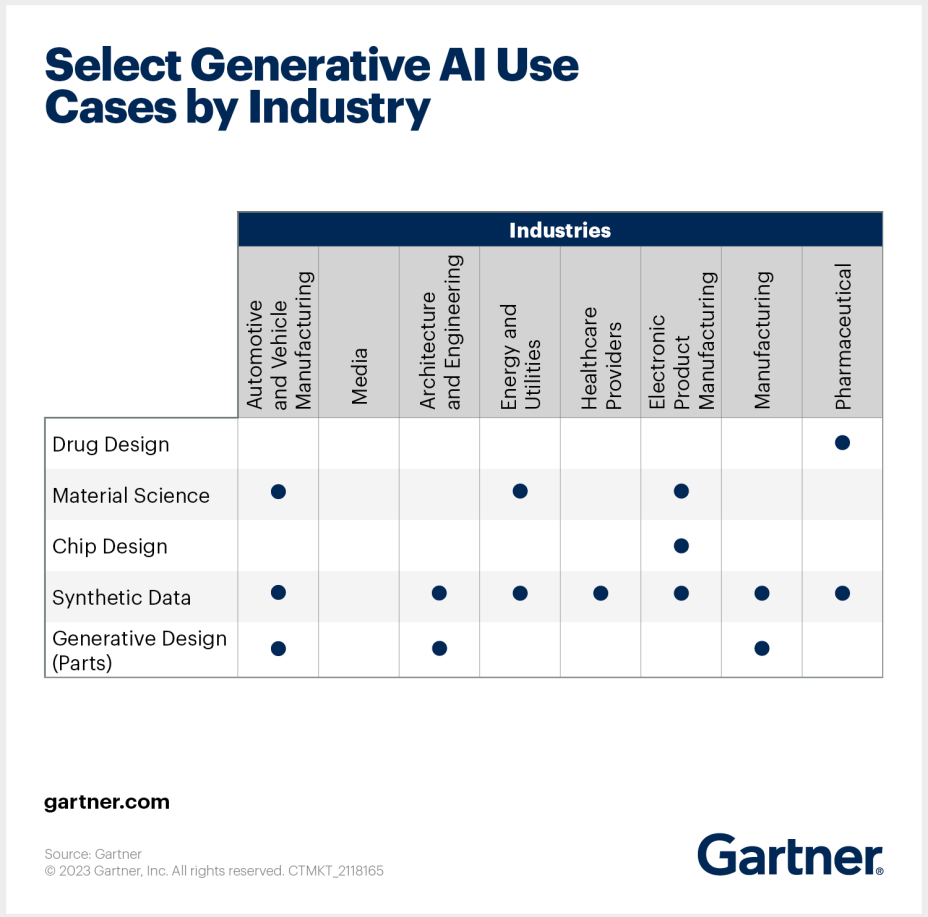
With pandemic-driven demand for robotic process automation (RPA) and intelligent automation tools set to increase exponentially in 2021, vendors are obliging accordingly. With over 150 RPA and intelligent automation tools now available and all making big claims, but varying significantly in design quality, technical capabilities and delivery approach, organisations face making the wrong choice.

The problem is that the significant differing technical capabilities of vendors will prove the difference between achieving short-term tactical benefits with potentially great effort and risk, or strategic work transformation at enterprise scale with less effort and minimal risk. Greater automation vendor differentiation insights and a clearer demarcation of these important technical nuances will hopefully start emerging this year.

2023 – A shift in trends

Focusing on the trends for the next 10 years in 2022 was not reflective of the shifts that occured in 2023 with Generative AI becoming mainstream. By early 2023, the talk of the town was ChatGPT and the potential uses and risks of this technology.





Source: Gartner, 2023[53]

The shift in narrative was obvious, with Gartner listing:

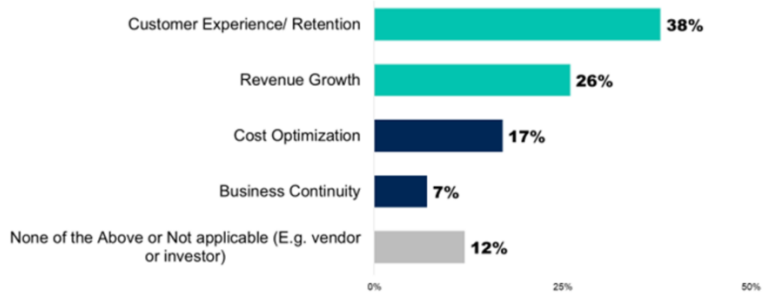
"Generative AI is primed to make an increasingly strong impact on enterprises over the next five years. Gartner predicts that:

- By 2024, 40% of enterprise applications will have embedded conversational AI, up from less than 5% in 2020.
- By 2025, 30% of enterprises will have implemented an AI-augmented development and testing strategy, up from 5% in 2021.
- By 2026, generative design AI will automate 60% of the design effort for new websites and mobile apps.
- By 2026, over 100 million humans will engage robocolleagues to contribute to their work.
- By 2027, nearly 15% of new applications will be automatically generated by AI without a human in the loop. This is not happening at all today."[54]

[53] https://www.gartner.com/en/articles/beyond-chatgpt-the-future-of-generative-ai-for-enterprises

[54] https://www.gartner.com/en/topics/generative-ai#:~:text=to%20their%20products.-,What%20does%20Gartner%20predict%20for%20the%20future%20of%20generative%20AI,less%20than%205%25%20in%202020.

Fig. 1: Primary Focus of Generative AI Investments (Percentage of Respondents)



Source: Gartner (May 2023)

Source: Gartner, 2023[55]

Generative AI is not the only trend evident in 2023.

Source: Gartner, 2023[56]

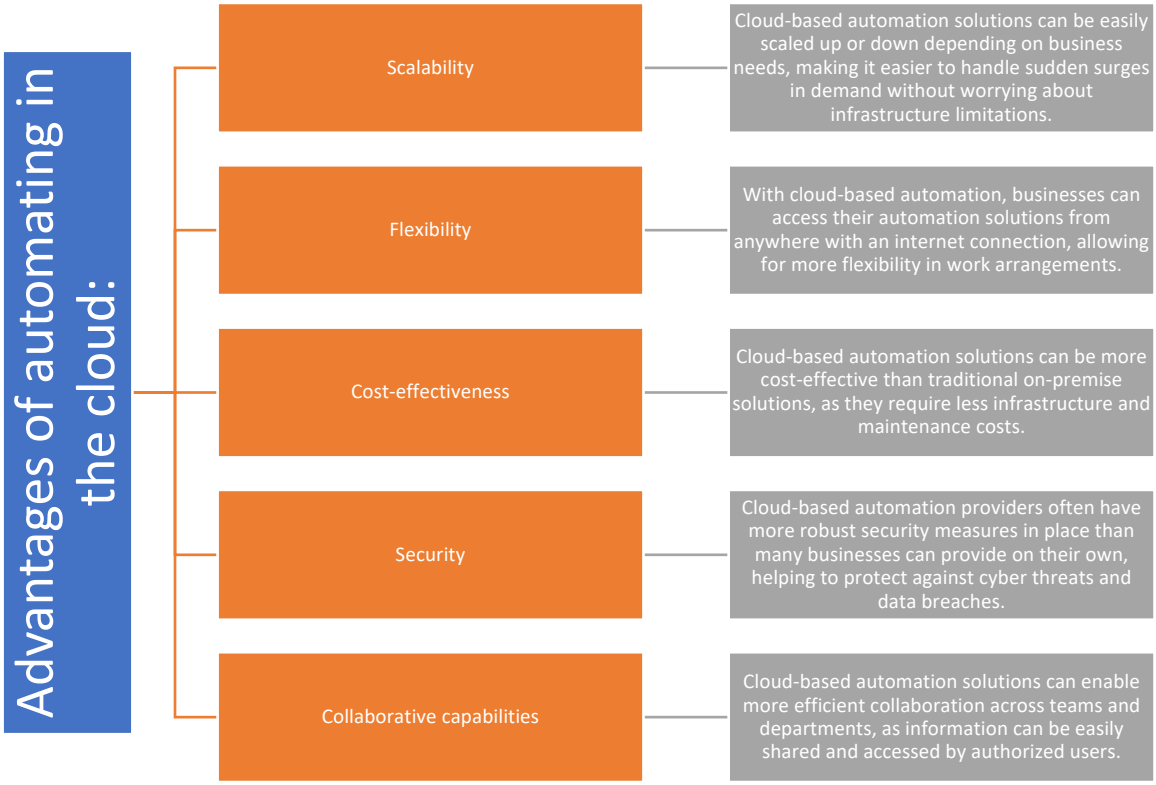
[55] https://www.gartner.com/en/newsroom/press-releases/2023-05-03-gartner-poll-finds-45-percent-of-executives-say-chatgpt-has-prompted-an-increase-in-ai-investment

[56] https://www.gartner.com/en/industries/high-tech/trends/top-trends-for-tech-providers

Greater adoption of Robotic Process Automation (RPA)	RPA has been gaining momentum in recent years as businesses seek to automate repetitive tasks and improve efficiency. Finance departments have been early adopters of RPA, using it to automate tasks such as invoice processing and payment reconciliation. Marketing departments can also benefit from RPA by automating tasks such as social media posting and email marketing campaigns. Intelligent Process Automation (IPA)
Intelligent Process Automation (IPA)	IPA is the next evolution of RPA, combining automation with artificial intelligence and machine learning to enable more complex and cognitive tasks..
Increased use of Artificial Intelligence and Machine Learning(AI)	Artificial intelligence and machine learning (ML) have been among the most significant technological advancements in recent years, and their impact is only set to grow in 2023. From chatbots and virtual assistants to autonomous vehicles and predictive analytics, AI and ML are being integrated into an ever-expanding range of applications across industries.
Low-code/No-code Development	Low-code and no-code development is a way for businesses to create applications without requiring traditional coding knowledge. This is achieved through visual interfaces and drag-and-drop tools that allow anyone to create software applications with ease. This trend has been gaining traction in recent years, with the rise of platforms like Monday.com. The benefits of low-code and no-code development are clear. It allows businesses to create custom software applications quickly and easily, without the need for extensive coding knowledge. The growing importance of data management and governance
The growing importance of data management and governance	Effective data management and governance are becoming critical for businesses in all industries, regardless of their size. The increasing use of cloud-based solutions and the growth of big data have resulted in an explosion of data, making it difficult to manage, analyse, and use it effectively. This has made data governance a key concern for businesses. By implementing a comprehensive data management and governance system, businesses can streamline their data management processes and ensure that data is clean, accurate, and consistent across all systems.
Expansion of cloud-based automation solutions	Cloud-based automation solutions are becoming more prevalent as businesses seek to reduce the cost and complexity of on-premises solutions. Marketing departments can benefit from cloud-based automation by using tools such as marketing automation platforms to manage and automate marketing campaigns. For example, a cloud-based marketing automation platform can be used to manage email marketing campaigns, social media posting, and lead scoring. This can reduce the time and effort required to manage these processes, and improve the overall effectiveness of marketing campaigns.
Rise of Hyper-Automation	Hyper-automation is a step further than traditional automation, using advanced technologies like AI, machine learning, and robotic process automation to create ful

Source: SYSCOR, 2023[57]

[57] https://syscor.ai/2023/03/14/7-automation-trends-to-look-out-for-in-2023-and-beyond/



Source: SYSCOR, 2023[58]

[58] https://syscor.ai/2023/03/14/7-automation-trends-to-look-out-for-in-2023-and-beyond/

A resilient trend - Automation for Good

Intelligent Automation (IA) is more than just a tool for increasing efficiency and productivity. When used thoughtfully and ethically, it can also be a force for good, contributing to social and environmental sustainability.

Automation for good is about using IA to create positive social and environmental impact. This can involve using automation to reduce energy consumption, improve access to services, create jobs, and support social and economic development. For example, automation can streamline the delivery of public services, making them more accessible and efficient.

Incorporating automation for good into IA strategies involves considering the social and environmental impact of IA initiatives from the outset. This can involve conducting impact assessments, engaging with stakeholders, and developing ethical guidelines for using IA. It also involves looking for opportunities to use IA to support social and environmental goals, such as by automating energy-efficient processes or creating jobs in underserved communities.

Several organizations are already showcasing the potential of automation for good. For example, UiPath has launched a series of webinars on the topic, highlighting how automation can be used to support sustainability and social good. Similarly, a white paper by IDC discusses how organizations are planning to implement robotic process automation (RPA) to support social and environmental goals.

These case studies demonstrate the potential of automation for good, and provide valuable insights for other organizations looking to incorporate social and environmental considerations into their IA strategies.

You may find out more by reading the UiPath report on the topic to which we contributed: https://www.socialinnovationsolutions.org/trends-reports/automation-for-good

Introduction: PHILOSOPHICAL ARGUMENTS ON "WHAT IS GOOD?"

Chapter 1. WHAT IS AUTOMATION FOR GOOD?

Chapter 2. THE IMPACT OF AFG ON COMMUNITIES FOR LIVING

1. Better homes and cities
2. Better food
3. Better energy
4. Better health
5. Better education

Chapter 3. THE IMPACT OF AFG ON BUSINESS COMMUNITIES

1. Better work
2. Better manufacturing and circular economy
3. Better sustainable and inclusive finance

Chapter 4. THE IMPACT OF AFG ON FORMAL COMMUNITIES

1. Better governments
2. Better NGOs

Chapter 5. 2030 TRENDS IN AUTOMATION FOR GOOD

Source: Roxana Voicu-Dorobantu in the UiPath – SIS report, 2022

Conclusion: IA and Public Policy Delivery

Intelligent Automation (IA) holds significant potential for economic growth, productivity, and societal benefits. However, the realization of this potential is not automatic and requires supportive public policies at the national level. These policies should aim to foster the development and use of IA, while also addressing the associated challenges and risks.

Creating an Enabling Environment for IA

Public policy can play a crucial role in creating an enabling environment for IA. This can involve a range of measures, including:

1. **Investing in Research and Development (R&D)**: Public investment in R&D can stimulate innovation in IA, leading to the development of new technologies and applications.

2. **Developing Digital Infrastructure**: Robust digital infrastructure is a prerequisite for the effective use of IA. Public policy should therefore aim to ensure that such infrastructure is available and accessible.

3. **Promoting Skills Development**: The successful implementation of IA requires a workforce with the necessary skills. Public policy can support skills development through measures such as education and training programs.

While IA offers significant benefits, it also presents a number of challenges and risks. Public policy should aim to address these through measures such as:

1. **Regulating IA**: IA can raise a range of legal and ethical issues, from data protection to employment rights. It is therefore crucial that public policy provides a clear and robust regulatory framework for IA.

2. **Mitigating Social Impacts**: The use of IA can have significant social impacts, including job displacement. Public policy should aim to mitigate these impacts, for example through social protection measures and initiatives to support job transition.

3. **Ensuring Inclusivity**: There is a risk that the benefits of IA could be unevenly distributed, leading to increased inequality. Public policy should therefore aim to ensure that the benefits of IA are shared widely, and that all sections of society have the opportunity to participate in and benefit from the IA revolution.

In conclusion, public policy has a crucial role to play in fostering IA at the national level. By creating an enabling environment and addressing the associated challenges and risks, public policy can help to ensure that IA delivers maximum benefits for society.

Shifting the perspective, IA can also be used in public policy delivery, and it is increasingly playing a pivotal role in public policy delivery at the national level[59]. By automating routine administrative tasks, IA can significantly enhance the efficiency and effectiveness of public services, leading to better outcomes for citizens and more judicious use of public resources.

The role of IA in public policy delivery is multifaceted. It can be used to streamline bureaucratic processes, reduce errors, and free up public servants to focus on more complex and value-added tasks. For example, Robotic Process Automation (RPA) can automate the processing of paperwork, following a set of predefined rules[60].

Moreover, IA can also support more strategic aspects of public policy delivery. Advanced IA technologies, such as artificial intelligence (AI) and machine learning, can be used to analyze large volumes of data, identify patterns and trends, and inform policy decisions. This can lead to more evidence-based and effective policies.

However, the use of IA in public policy delivery also raises important ethical and governance issues[61]. These include questions about transparency, accountability, and the impact on jobs. It is therefore crucial that the use of IA in public policy delivery is guided by a strong ethical framework and robust governance mechanisms.

In conclusion, IA has the potential to transform public policy delivery at the national level. However, realizing this potential requires not only technological innovation but also careful consideration of the ethical and governance implications.

Increasing the scope to EU-wide, the European Union, with its diverse member states and vast resources, is uniquely positioned to drive the IA agenda forward. At the European level, public policy plays a crucial role in fostering the development and implementation of Intelligent Automation (IA). The EU can play a significant role in creating an enabling environment for IA. This can be achieved through:

[59] https://www.bcg.com/publications/2021/unlocking-value-ai-in-government
[60] https://www.brookings.edu/articles/how-robotic-process-and-intelligent-automation-are-altering-government-performance/
[61] https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/662936/IPOL_BRI(2021)662936_EN.pdf

1. **Investing in Research and Development (R&D)**: The EU can stimulate innovation in IA by investing in R&D at a pan-European level. This can be facilitated through various funding programs and initiatives[62].

2. **Developing a Digital Single Market**: The EU's Digital Single Market strategy aims to open up digital opportunities for businesses and enhance Europe's position as a world leader in the digital economy. This includes fostering the development and use of IA[63].

3. **Promoting Skills Development**: The EU can support skills development through its various education and training programs. This includes initiatives aimed at developing the digital skills needed for IA[64].

Addressing the Challenges and Risks of IA

The EU also has a role to play in addressing the challenges and risks associated with IA. This includes:

1. **Regulating IA**: The EU can provide a clear and robust regulatory framework for IA. This includes regulations related to data protection, privacy, and ethical considerations[65].

2. **Mitigating Social Impacts**: The EU can help mitigate the social impacts of IA, such as job displacement, through its social policies and funding programs[66].

3. **Ensuring Inclusivity**: The EU can ensure that the benefits of IA are shared widely among its member states and citizens. This includes initiatives aimed at reducing digital divides and promoting digital inclusion[67].

As Intelligent Automation (IA) continues to evolve and impact various sectors, it is crucial for policy makers to proactively shape the policy landscape to foster the development and implementation of IA. Here are some recommendations for policy makers:

1. **Promote Research and Development (R&D)**: Policy makers should encourage R&D in IA by providing funding and creating incentives for businesses and academic

[62] https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en
[63] https://ec.europa.eu/digital-single-market/en/policies/shaping-digital-single-market
[64] https://education.ec.europa.eu/focus-topics/digital-education/action-plan
[65] https://commission.europa.eu/law/law-topic/data-protection_en
[66] https://ec.europa.eu/social/main.jsp?catId=750&langId=en
[67] https://ec.europa.eu/digital-single-market/en/digital-inclusion-better-eu

institutions. This can lead to innovation and the development of new IA technologies[68].

2. **Develop Robust Digital Infrastructure**: A robust digital infrastructure is a prerequisite for the effective use of IA. Policy makers should therefore prioritize the development of digital infrastructure, including high-speed internet and data centers[69].

3. **Foster Skills Development**: The successful implementation of IA requires a workforce with the necessary skills. Policy makers should support skills development through education and training programs, and by integrating digital skills into the curriculum[70].

4. **Regulate IA**: IA can raise a range of legal and ethical issues. Policy makers should develop a clear and robust regulatory framework for IA, addressing issues such as data protection, privacy, and the ethical use of AI[71].

5. **Mitigate Social Impacts**: The use of IA can have significant social impacts, including job displacement. Policy makers should develop social policies to mitigate these impacts, such as social protection measures and initiatives to support job transition[72].

6. **Ensure Inclusivity**: The benefits of IA should be shared widely among society. Policy makers should develop policies to ensure digital inclusion and reduce digital divides[73].

In conclusion, policy makers have a crucial role to play in fostering the development and implementation of IA. By taking proactive steps, they can help ensure that IA delivers maximum benefits for society.

More insights on public policy and automation interaction may be found in our whitepaper on Algorithmic Governance.

[68] https://www.itic.org/documents/artificial-intelligence/ITI_GlobalAIPrinciples_032321_v3.pdf
[69] https://www2.deloitte.com/us/en/insights/focus/signals-for-strategists/intelligent-automation-a-new-era-of-innovation.html
[70] https://www.mckinsey.com/featured-insights/future-of-work/ai-automation-and-the-future-of-work-ten-things-to-solve-for
[71] https://hbr.org/2021/11/managing-ai-decision-making-tools
[72] https://www.brookings.edu/articles/how-robotic-process-and-intelligent-automation-are-altering-government-performance/
[73] https://digital-strategy.ec.europa.eu/en/policies/digital-inclusion

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