

pipefy



AI Trends in Process Automation:

Everything You Need to Know

Index

03

04

05

09

13

16

20

1. Introduction

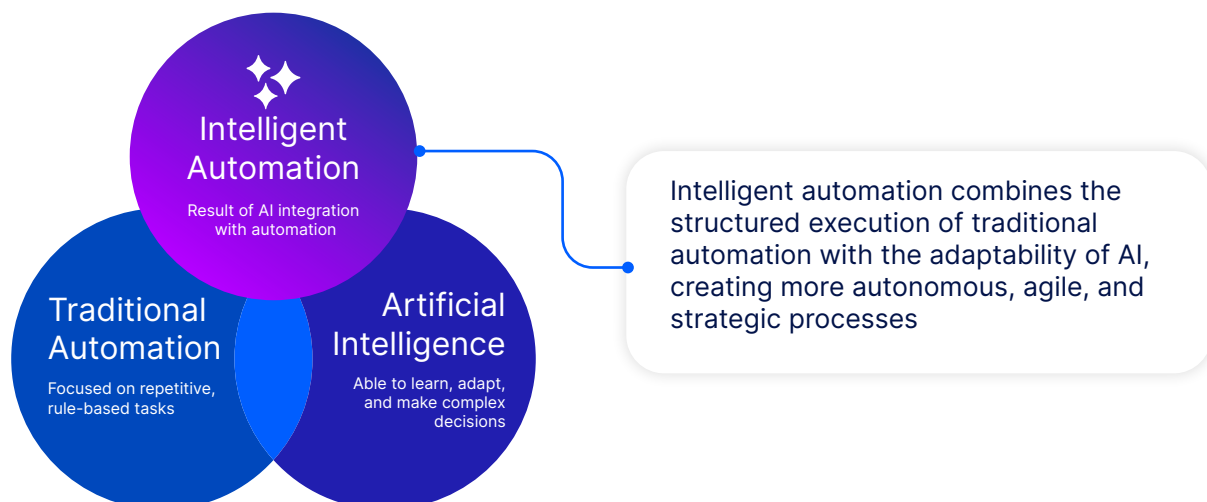
For nearly two decades now, **digital transformation** has posed a major challenge for the market. What began as a distant trend has gradually become an inevitable reality for companies, especially in the last five years, accelerated by the pandemic.

In the race for digitalization, **process automation** has emerged as one of the most powerful strategies for companies seeking greater efficiency and aiming to scale their operations. And now, with the disruptive rise of **Artificial Intelligence (AI)**, automation has reached a **new level of maturity**.

This technology, once confined to labs and tech hubs, is now playing an increasingly decisive role in business routines, unlocking a level of potential never seen before in automation.

In this report, we'll explore the **main AI trends applied to process automation**, including:

- ✓ How different industries are adopting AI in practice;
- ✓ Who the leading AI agents in automation are;
- ✓ A future outlook for intelligent automation;
- ✓ And how platforms like **Pipefy** can help transform operational workflows into **smart processes**, effortlessly connecting systems, people, and decisions with more fluidity, speed, and scale.



2. Current Landscape of AI-Powered Automation

While some sectors are still evaluating how Artificial Intelligence can benefit their businesses, others have moved ahead by making it a core part of their operations - and they're already reaping increasingly significant results. [According to Accenture, companies with AI-driven processes show revenue growth 2.5 times higher than their peers.](#)

This progress, driven by technological maturity and rising competitive pressure, has led to an [accelerated pace of AI adoption across organizations.](#)

A report by [Invezz](#) reveals that



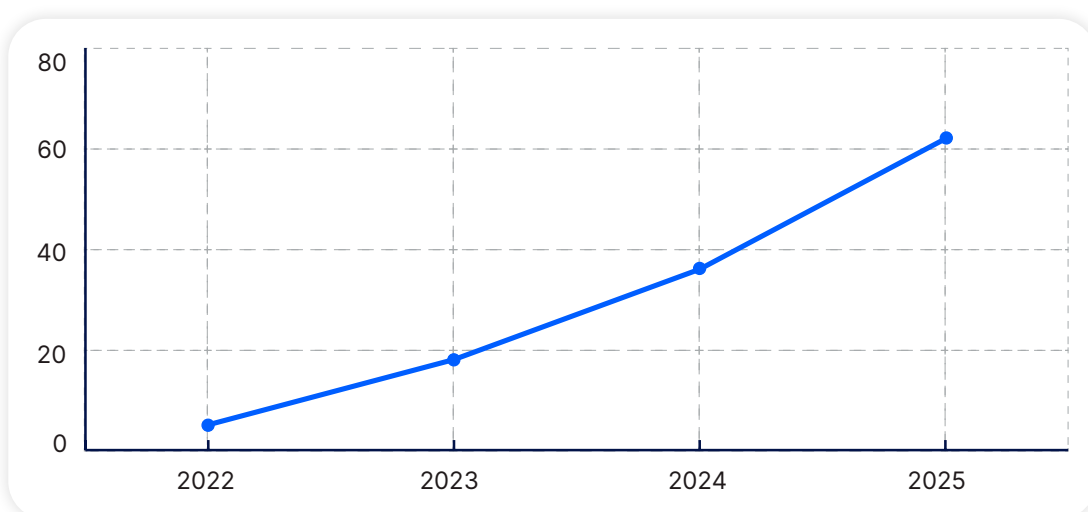
of companies worldwide are already using some form of AI in their operations. This number starkly contrasts with the 22% recorded the previous year, representing growth of over 240% in just twelve months.

The investment outlook for AI also indicates expansion. [IDC](#), estimates show global AI spending surpassed

US\$ 166 billion

in 2023 and is expected to grow at a compound annual growth rate (CAGR) of 26.9% through 2027.

More specifically, the **market for AI-based automation**, which integrates intelligent models with automated workflows, [is projected to reach \\$135.06 billion by 2034, with an average annual growth of 23.5% beginning in 2025.](#)



Global Growth of Artificial Intelligence Investments in Automation (2022-2025)

While this evolution isn't uniform, its global footprint is expanding. Among the continents, North America leads in corporate AI adoption, followed by **Europe** and the **Asia-Pacific** region. [Latin America, however, is surprising analysts: 26% of companies in the region have already implemented AI at scale](#), outperforming the average of some more traditional economic blocs.

The trend is expected to intensify, especially in industries such as **financial services, healthcare, retail, and logistics**, which already lead in practical AI applications.

From a strategic perspective, the main drivers for adopting AI in automation processes **include increased productivity, improved customer experience, and fostering innovation**. These motivations reflect a broader transformation: AI is no longer seen merely as an emerging technology. It's now becoming central to modern, sophisticated operating models.

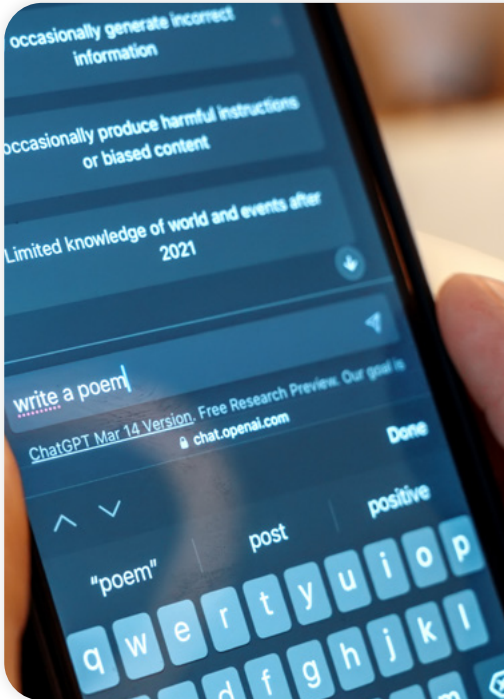
In the next chapter, we'll explore the key AI technologies shaping this new era of intelligent automation, and why they're worth your attention.

3. AI Technology Trends for Automation

As business processes become increasingly complex, interconnected, and dynamic, so does the demand for technologies capable of handling real-time variables, massive volumes of data, and decisions that no longer fit within rigid workflows or predefined rules.

In response, different branches of Artificial Intelligence have been incorporated into automation platforms, adding new layers of **interpretation, adaptability, and autonomy**. Tasks that once required dozens of manual integrations can now be orchestrated by systems that understand **natural language, analyze visual patterns, learn from usage, and make proactive suggestions**.

This is the context in which the leading AI technologies applied to automation are emerging. Let's explore some of the most relevant ones:



Natural Language Processing (NLP)

Natural Language Processing (NLP) enables [systems to understand and process human language](#), streamlining the automation of tasks such as customer support, sentiment analysis, and data extraction from documents.

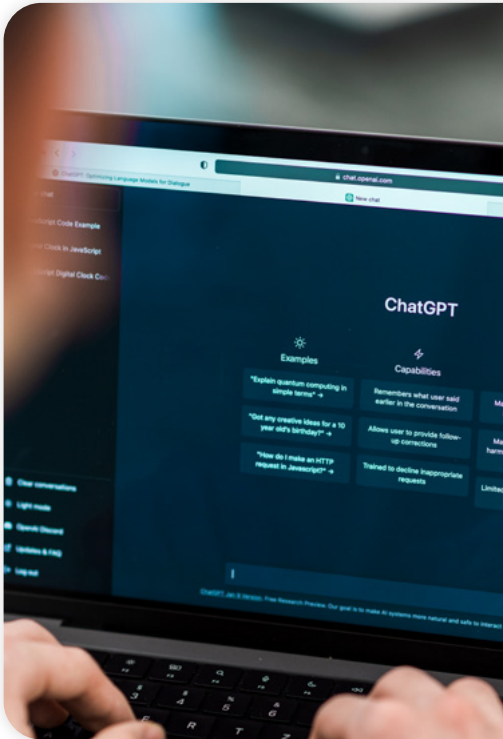
Pipefy, for instance, integrates NLP capabilities into its process automation platform to enhance the way users interact with the system. Through natural language-based automations, users can **configure workflows using text commands**, making it easier to build and manage processes without complex coding. This approach empowers teams across departments to implement automations intuitively, quickly, and efficiently.

Computer Vision

Computer Vision, [enables systems to interpret and analyze visual data](#), allowing operations to automate quality inspections, recognize patterns, and monitor processes in real time.

In industrial environments, this technology has proven fundamental for improving accuracy and operational efficiency, particularly in manufacturing and logistics sectors. **Amazon**, for example, uses computer vision in its distribution centers to **track products and optimize storage**, significantly reducing order processing times.





Generative AI

Generative AI, including models such as ChatGPT, Gemini, and others, has been primarily used to create content, automate responses, and generate insights from large datasets.

Starbucks recently announced the launch of “[Green Dot Assist](#)”, a virtual assistant based on generative AI. Developed on the [Microsoft Azure OpenAI platform](#), the assistant is currently being rolled out in 35 stores across the United States and Canada.

This AI-powered [agent supports baristas by providing real-time assistance with tasks](#) such as beverage recipes and equipment troubleshooting, streamlining service and reducing average order times.

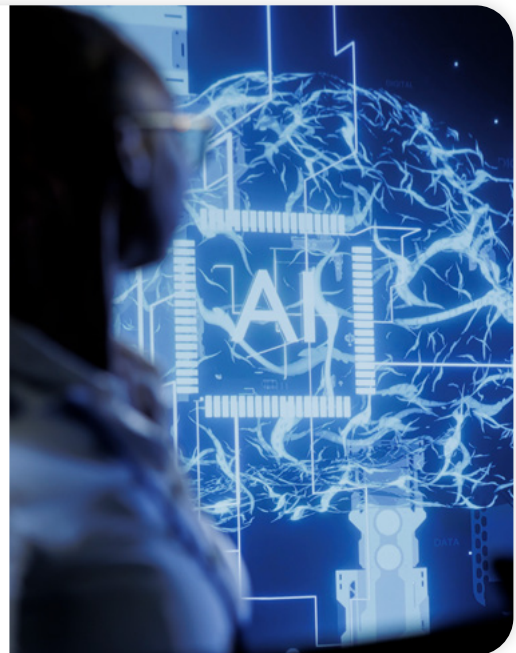
Employees can interact with the assistant using voice or text via tablets available in stores, ensuring quick access to essential information and enhancing both the employee and customer experience.

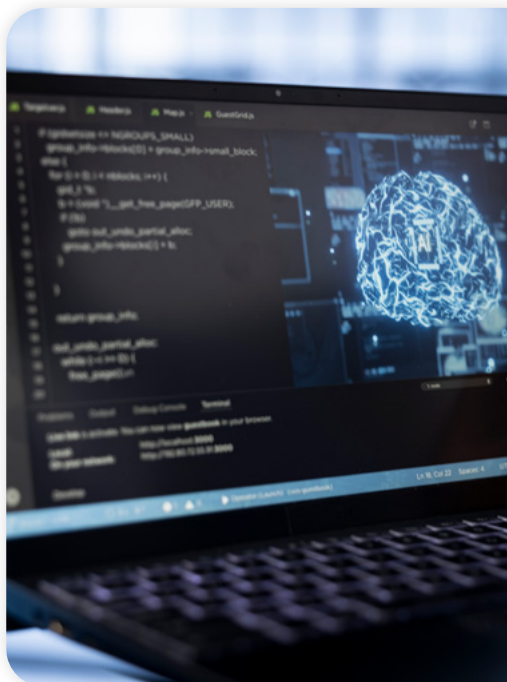
Supervised Machine Learning

Another relevant trend is Supervised Machine Learning, which uses labeled data to train models capable of **predicting outcomes** and **automating decisions**. This approach is widely adopted in credit scoring, fraud detection, and predictive maintenance.

Financial institutions such as **Banco do Brasil**, for instance, apply supervised models to **prevent fraud** and **offer more accurate proposals to their clients**.

In the industrial sector, companies like **GE** use supervised learning for predictive maintenance of equipment, anticipating failures and avoiding unplanned downtimes, ultimately reducing operational costs.





Unsupervised Machine Learning

Unsupervised Machine Learning identifies patterns and structures within unlabeled data, making it useful for **customer segmentation**, **anomaly detection**, and **exploratory data analysis**. This technique enables companies to uncover hidden insights and optimize processes without constant human supervision.

A real-world example is seen in streaming platforms like **Netflix**, which segments users based on their viewing habits to deliver **personalized recommendations**.

Another notable use case comes from the **cybersecurity sector**, where unsupervised algorithms detect unusual behavior within corporate networks, helping prevent cyberattacks before significant damage occurs.

AI Technology Trends: Sectors and Benefits

| Technology | Key Sectors | Benefits |
|-----------------------------------|--------------------------------------|--|
| Natural Language Processing (NLP) | Customer Service, Legal, Financial | Language understanding, text automation |
| Computer Vision | Manufacturing, Logistics, Healthcare | Visual pattern recognition, automated inspection |
| Generative AI | Retail, HR, Marketing | Content generation, decision support |
| Supervised Machine Learning | Banking, Industry, Insurance | Data-driven forecasting and diagnostics |
| Unsupervised Machine Learning | Streaming, Security, Retail | Discovery of patterns and hidden clusters |

Key AI technology trends for automation, their primary sectors of application, and core operational benefits

As technologies like NLP, generative AI, and machine learning become increasingly advanced and accessible, a new model is gaining momentum in enterprise operations: automation driven by **AI Agents**. In the next chapter, we'll take a closer look at **how they work**, the main types of agents available, and how they are being **used in real-world scenarios** to transform processes across different areas of a business.

4. The Leading AI Agents for Process Automation

AI Agents, with varying levels of intelligence and autonomy, have the potential to automate end-to-end tasks without relying on fixed rules or manual commands. Their impact continues to grow as they become more interactive, interconnected, and intelligent.

Let's explore the main types of AI Agents and how they are being applied in practice to automate business processes:

Reactive, Proactive, and Adaptive Agents: Understanding the Autonomy Spectrum

Reactive Agents

Respond instantly to triggers. They act like sensors that trigger a predefined action when a specific input is detected. These agents are common in simple automated flows, such as sending an email after a form is completed or replying to a request.

Proactive Agents

Go a step further, they can anticipate needs based on patterns, context, and historical data. They identify process bottlenecks or risks and autonomously take action to prevent them. A practical example is reprioritizing service queues based on SLA urgency (Service Level Agreement).

Adaptive Agents

represent a more advanced level of intelligence. They learn over time and refine their behavior based on feedback and outcomes. On platforms like **Pipefy**, for instance, adaptive agents can analyze process card data, detect recurring issues, and automatically suggest improvements or fixes.

Practical Applications: Far Beyond “Following Commands”

Today, **AI Agents** are proving especially effective across three key operational areas:

Intelligent task routing:

Agents monitor workflows in real time and automatically reassign tasks based on workload, employee profiles, or item priority.

End-to-end workflow execution:

They can populate fields, validate information, generate documents, trigger integrated systems, and drive entire processes without human intervention.

Monitoring with insights and decision-making:

Agents analyze operational data, detect patterns or anomalies, and offer proactive suggestions, such as flagging an SLA at risk of being missed or recommending a response to a customer based on prior interactions.

Rule-Based vs. LLM-Based AI Agents: A New Intelligence Frontier

With the rise of **generative AI**, one distinction is becoming increasingly relevant: the difference between **rule-based agents** and those powered by **LLMs** (Large Language Models). This marks a turning point in how agents operate, particularly in corporate environments.

Rule-based AI agents are built to follow fixed scripts. They work well for simple logic tasks but lack flexibility and struggle with unexpected scenarios.

LLM-based agents, on the other hand, draw from billions of parameters and vast volumes of textual data. This allows them to interpret ambiguous commands, understand intent, make inferences, and even learn from previous interactions, essential capabilities for agents operating in more dynamic environments.

According to a [McKinsey report](#), integrating generative language models (LLMs) could unlock between **\$2.6 trillion and \$4.4 trillion in annual economic value** by driving productivity in fields like customer service, marketing and sales, software engineering, and R&D.

At Pipefy, for example, LLM-powered AI agents are already being used to interpret natural language requests, extract data from documents, and execute contextual actions, such as answering employee questions, automatically categorizing requests, and predicting process bottlenecks.

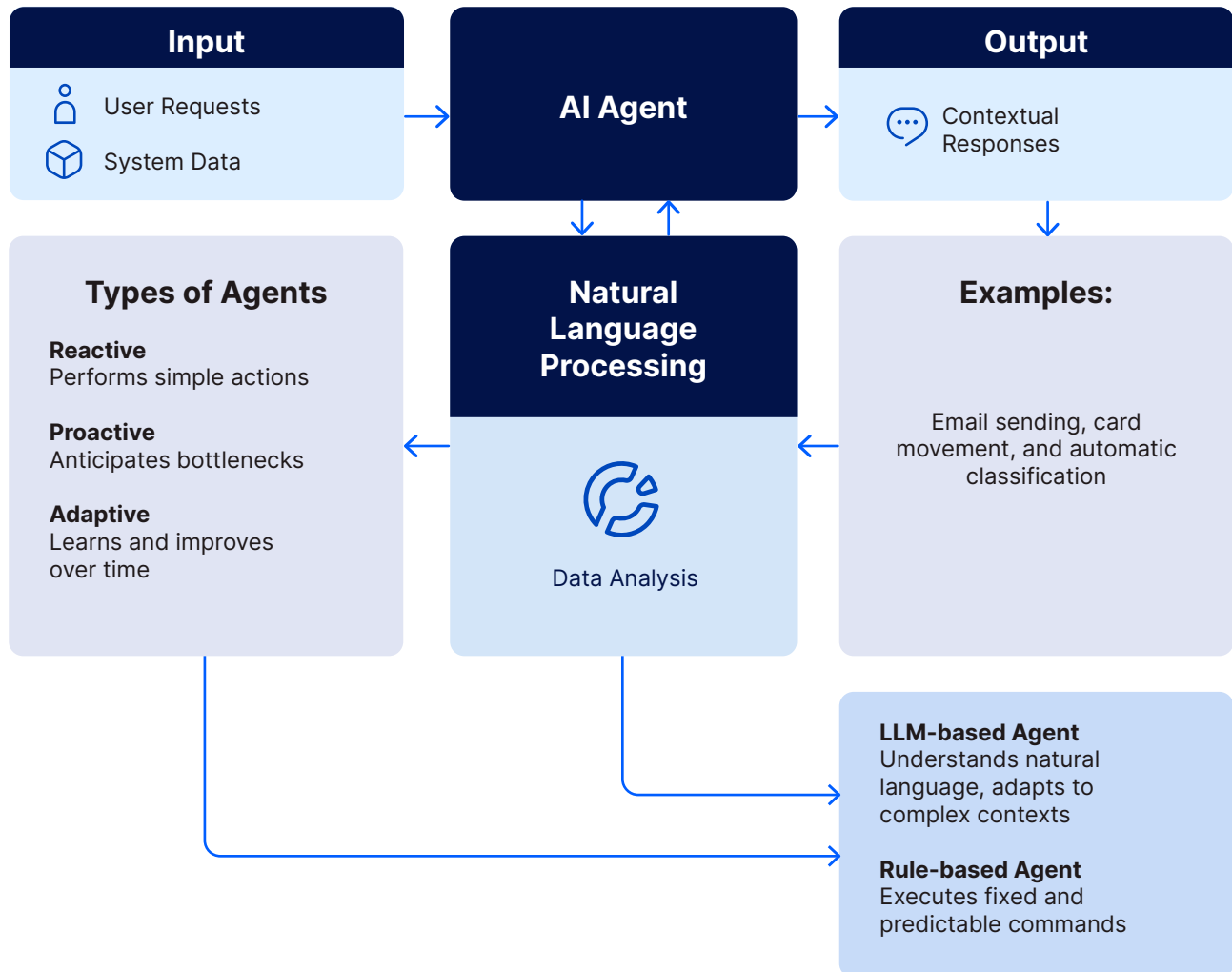
What Comes Next?

Above all, one conclusion is clear: **the rise of AI Agents is still in its early stages**. They represent the convergence of **traditional automation** with **true intelligence**. And what lies ahead points to even greater potential, including the arrival of fully autonomous, self-adjusting agents, distributed architectures powered by federated AI, and the convergence of technologies like IoT (Internet of Things), RPA (Robotic Process Automation), and blockchain.

In the next chapter, we'll explore this emerging landscape and examine the future of intelligent automation, diving into the tech trends set to reshape workflows by the end of the decade.



Architecture of an AI Agent Operating in a Business Process



Illustrative diagram detailing the architecture of an AI Agent operating within a business process

5. What's Next: The Future of Intelligent Automation

So far, AI-powered automation solutions have demonstrated significant potential and value in driving efficiency and scale. However, the road ahead points to a new phase of evolution, one in which systems operate with even greater **autonomy, contextual intelligence, and continuous adaptability**.

In this chapter, we'll explore the next frontiers of AI-driven automation, diving into concepts such as **self-adjusting agents, federated learning**, and the convergence of technologies like **IoT, RPA, and blockchain**.

More than trends, these innovations offer a preview of what may become the new operational standard by the end of the decade. Let's take a closer look.

Autonomous and Self-Adjusting AI: Agents That Learn and Evolve

In the coming years, automation is expected to shift from being just an operational ally to becoming a strategic asset, and **autonomous agents** are at the heart of this transformation. These agents are capable of making decisions, adapting to new scenarios, and learning from their own interactions. This marks a fundamental shift: static scripts are being replaced by **evolving behaviors**.

Market projections indicate that the [global autonomous agent segment](#) will grow from approximately \$7.9 billion in 2025 to more than **\$235 billion by 2034**, driven largely by advancements in **self-improving architectures**.

Gartner also estimates that by 2028, 15% of decisions in corporate work environments will be made entirely autonomously.

One standout example is [Sakana AI](#) and its "Gödel Darwin Machine", an AI system that simulates natural evolution and has shown improvements from 20% to 50% in software engineering task benchmarks.

These developments make it clear that autonomous AI is no longer theoretical. It has already entered the validation stage, delivering real-world results.

Federated AI and Privacy Focus: Personalization with Security

Alongside increasing concerns over data protection, **Federated Learning (FL)** is emerging as a new foundation for training AI models in a secure, ethical, and decentralized way. In this model, learning happens where the data resides, eliminating the need for transfer or sharing.

This advancement is particularly relevant for sectors handling sensitive information, such as **healthcare, finance, and legal services**. According to [Grand View Research](#), the federated learning market is projected to reach **\$297.5 million by 2030**, establishing a new standard for AI governance.

Beyond data protection, FL fosters collaborative learning among institutions, enabling companies to gain **competitive intelligence** without compromising privacy. This is expected to become a decisive turning point in balancing **innovation** and **compliance**.

Technology Convergence: AI + IoT + RPA + Blockchain

The road ahead suggests that the future of automation will not be built on a single technology, but on the **coordinated convergence of multiple solutions**. The integration of AI with the **Internet of Things (IoT)**, **Robotic Process Automation (RPA)**, and **blockchain** is forming digital ecosystems that operate in real time, with transparency, traceability, and embedded intelligence.

Some practical examples of this convergence include:

- **Predictive maintenance:** Sensors connected via IoT feed AI algorithms that anticipate failures before they happen.
- **Smart contracts:** Entire processes can be automated through blockchain, ensuring validation of deliveries, payments, and obligations with full integrity.
- **RPA workflows governed by AI:** Bots that execute tasks based on data-driven or learned decisions.

According to a report by [UpSquareCS](#), companies adopting this convergence have achieved significant gains in efficiency, security, and scalability.

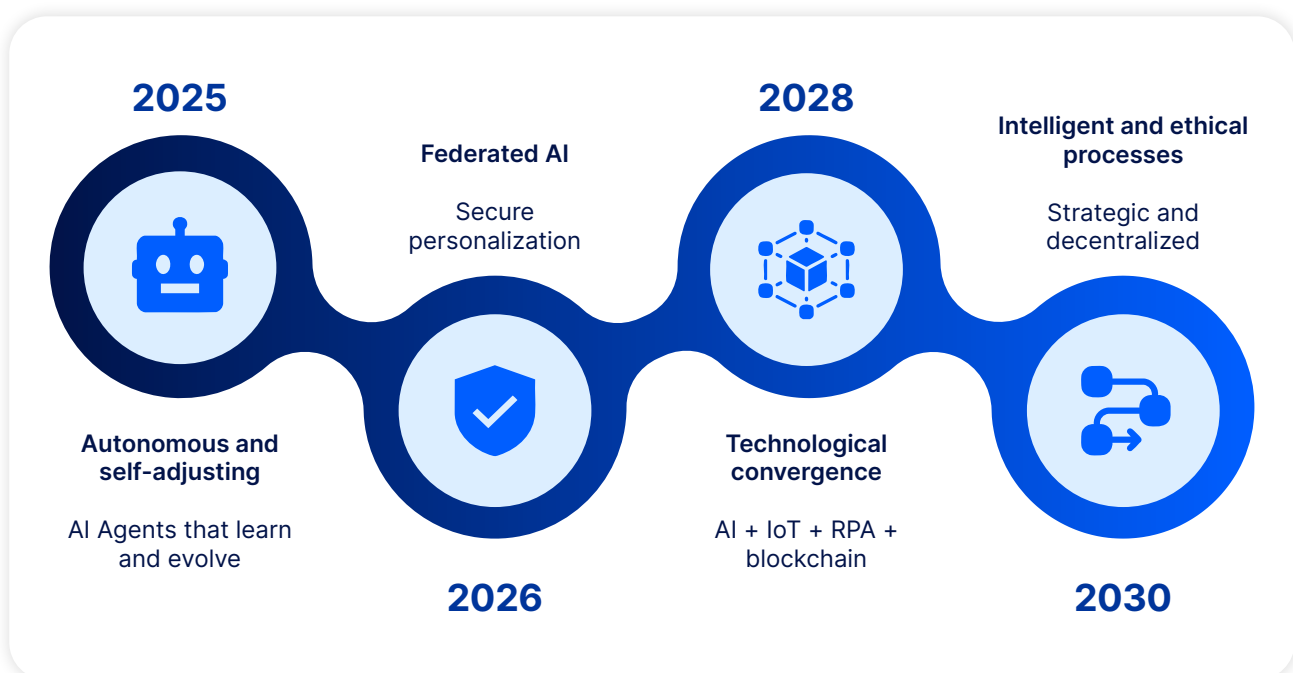
What Can We Expect by the End of the Decade?

Forecasts are pointing to a scenario where automation processes will become increasingly intelligent, strategic, ethical, and broadly distributed. By 2030, **AI Agents** are expected to operate with greater autonomy and decision-making capabilities across diverse business workflows, while **decentralized learning architectures** will likely become the standard for privacy and compliance.

With this outlook, companies will need to prepare. In the next chapter, we'll outline **strategic recommendations** for organizations looking to begin or scale their journey with AI-powered automation.

We'll explore the initial steps, recommended frameworks, and core pillars for building strong AI governance, from first experiments to large-scale adoption.

The Future of Intelligent Automation



Projected roadmap for the future of automation over the coming years (2025 to 2030)

6. The Best Strategic Recommendations

As Artificial Intelligence becomes a central driver of business transformation, so does the need for strategic guidance to ensure it is adopted in a **responsible, effective, and scalable** way.

Companies looking to begin or accelerate their AI journey should avoid generic or improvised approaches. Instead, they must build a **clear action plan** aligned with their organizational context and level of maturity.

In this chapter, we present the key pillars that should guide this journey, based on market best practices and the lessons learned from organizations already achieving tangible results.

Start with a Value-Oriented Assessment

Before making any moves, it's essential to identify where AI can truly make an impact in your business. This requires a **deep operational analysis**, mapping critical bottlenecks, manual workflows, and automation opportunities that deliver gains in scale, accuracy, or speed.

It's also important to assess the organization's readiness in terms of data, infrastructure, and culture.

According to Microsoft, the first stage of AI maturity involves **grasping the fundamentals of the technology**, identifying data gaps, and prioritizing processes with a clear return on investment (ROI).

Evaluate Your Organization's Maturity

Clarity on the company's AI maturity level helps **define realistic goals and choose the right strategy for each stage**. Organizations with low maturity should start with simple use cases and low-risk pilot projects. More advanced companies, on the other hand, can adopt sophisticated models and tools, such as hybrid architectures, adaptive agents, and predictive models at scale.

According to Keyrus, companies with high AI maturity are 3 to 5 times more likely to lead their markets due to their ability to extract strategic value from data and build smarter automations.

Build a Skilled and Multidisciplinary Team

AI implementation should not rest solely on the shoulders of IT and innovation teams. A successful team must bring together diverse skill sets, including:

- ✓ **Product Owners and Project Managers**, to lead initiatives and oversee deliverables.
- ✓ **Data Scientists, Data Engineers, and ML Engineers**, to design and operationalize models.
- ✓ **UX/UI Specialists, Security Experts, and AI Ethics Specialists**, to ensure a high-quality user experience, secure operations, and responsible AI use.

The recommended approach is to build teams using the learning-by-doing methodology, with continuous hands-on training.

Establish Strong AI Governance

Governance is not a detail, it's the foundation for ethical, secure, and transparent AI use. The suggested structure includes:

- ✓ An **AI Committee** with representatives from critical departments (IT, compliance, information security).
- ✓ **Clear policies** on usage, validation, and ongoing monitoring of models.
- ✓ **Risk management practices** including regular audits and protocols to ensure algorithmic transparency and safety.

According to McKinsey, organizations with mature governance frameworks are 50% more likely to capture significant AI-related benefits.

Plan a Phased Implementation

A phased rollout minimizes waste and boosts the chances of success. One suggested 12-month structure could look like this:

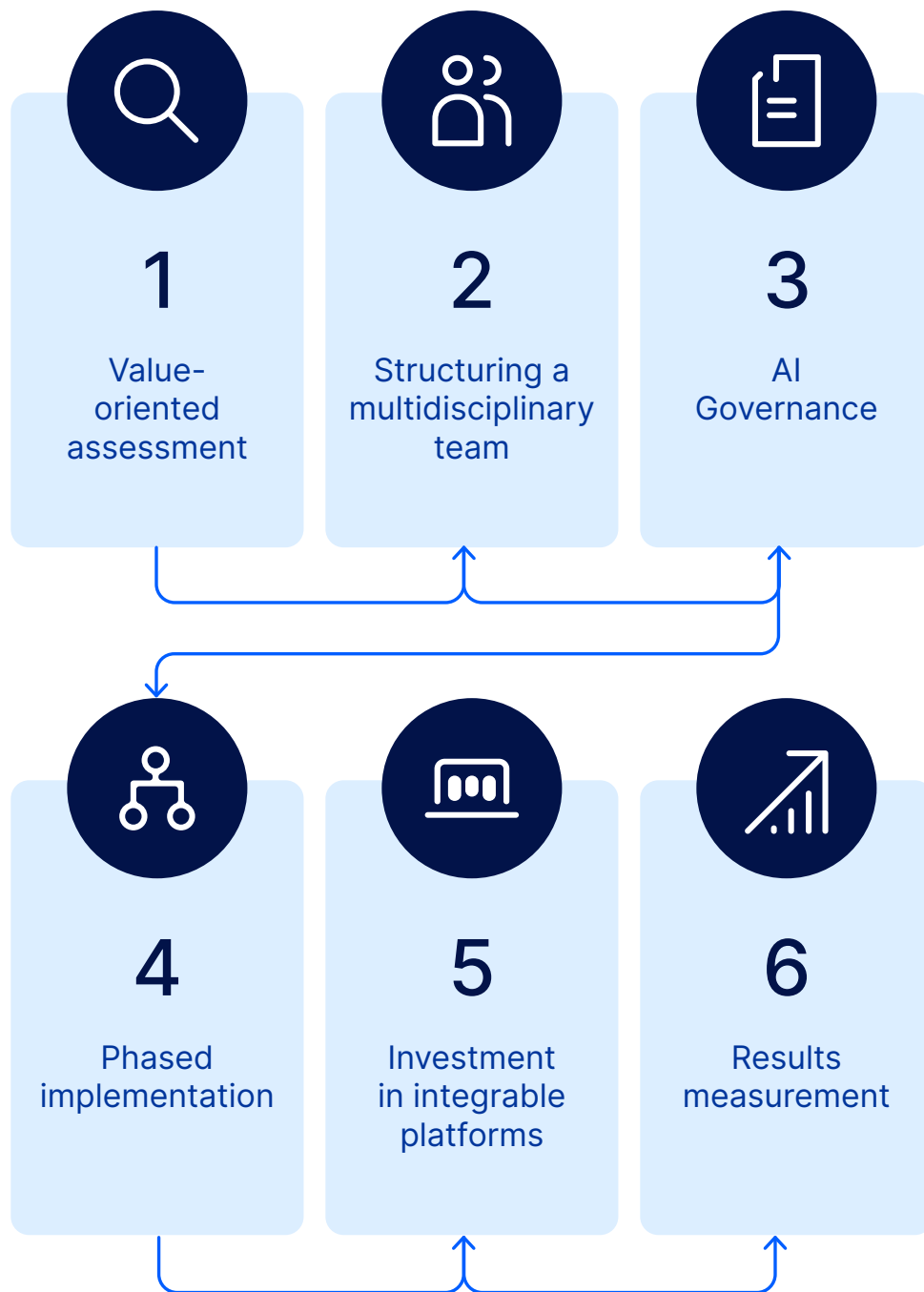
- ✓ **Months 1–3:** diagnostics, identification of priority use cases, and committee formation.
- ✓ **Months 4–6:** controlled pilots and iterative improvements based on feedback.
- ✓ **Months 7–9:** integration and expansion of successful initiatives.
- ✓ **Months 10–12:** optimization, ROI analysis, and planning for the next phase.

Prepare to Measure and Communicate Results

Setting KPIs from the start is essential. Key success indicators include:

- ✓ Reduction in operational costs;
- ✓ Self-service rate above 50%;
- ✓ Agent handoff rate below 30%;
- ✓ Productivity gains between 15% and 35% among SMBs investing in AI.

Now, in the final chapter, we'll recap the key takeaways and reinforce why AI should play a central role in the future of automation. We'll also highlight how **Pipefy** can support and grow with your company, regardless of your industry, at every step of the journey.



Roadmap outlining the recommended steps to structure, implement, and scale AI in process automation securely and strategically

7. How to Take the Next Step In Practice

We've reached a clear conclusion: AI-powered automation is no longer just a competitive advantage, it's becoming a **fundamental component of business operations**.

Throughout this report, we've explored the scope of results already being achieved through AI in organizations, the most relevant technologies, the most effective agents, and the safest paths to begin this journey.

But there's a real challenge between knowing what's ahead and putting it into action - and this is where platforms like **Pipefy** can make all the difference.

Pipefy enables companies of all sizes to connect people, data, and systems in an intelligent, scalable, and seamless way. By combining **no-code automation** and **generative AI**, the platform gives teams a new way to operate, more autonomous, more accurate, and more strategic.

With Pipefy's AI Agents, your company can transform manual flows into smart, automated processes, from request triaging to personalized responses. This applies across departments such as HR, Finance, Legal, Customer Service, and more, including complex, distributed operations.

Currently, the **financial services**, **insurance**, and **consumer goods** sectors are among the leaders in adopting AI for process automation. Their focus is on reducing operational costs, accelerating internal flows, and delivering highly personalized experiences to customers. Let's take a brief look at how and why:

Financial Services

The financial sector is among the most advanced in intelligent automation initiatives. Major institutions such as [JPMorgan Chase and Mastercard](#), already use generative AI and natural language models to **enhance fraud detection**, **speed up regulatory processes**, and **increase productivity** in areas like customer service and compliance.

Insurance

Insurance companies are rapidly adopting AI to automate processes, especially in **claims handling, risk analysis, and customer support**.

A **McKinsey** study showed that [insurers automating critical tasks with AI reduced claim resolution time by up to 30%](#), and improved pricing accuracy for policies. AI is also being used to generate predictive insights that support underwriting and customer retention decisions.

Consumer Goods

In the consumer goods industry, AI plays a key role in **automating the supply chain, personalizing experiences, and accelerating product time-to-market**.

According to [Deloitte's "2023 Consumer Products Industry Outlook" report](#), companies classified as "**profitable growers**" in this sector have heavily invested in automation, predictive analytics, and personalization in recent years. Intelligent automation allows them to operate more efficiently and respond more quickly to changing consumer behavior.

Across all three sectors, the rapid progress reinforces that AI has moved well beyond "task optimization." It's redefining how companies **operate, make decisions, and innovate**. As the technology becomes more accessible and sophisticated, new possibilities emerge, supported by increasingly powerful tools, like the **Pipefy toolbox**.

The platform offers a complete feature set, from foundational capabilities to advanced features such as **natural language-based automation, real-time insight dashboards, and integration with legacy systems and APIs**. All of this to help companies accelerate their digital transformation while maintaining governance and security.



Transform the Way You Operate with **AI-Powered** Automation

See firsthand how Artificial Intelligence can revolutionize your company's processes. With Pipefy, you can connect people, systems, and data into smart, scalable, and frictionless workflows — **all without writing a single line of code.**

Book a free demo
and experience the real impact of intelligent automation
in your daily operations within just 15 days.

BOOK A DEMO

Book a free and personalized demo today.