A Map Through the Automation Jungle

A Cloudomation Whitepaper

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Introduction

What is iBPMS? What is iPaaS? What is RPA? What is hyperautomation and do I really need it?

The software automation market has been booming and diversifying over the last decade or so, when robotic process automation (RPA) started to take off, Data Science became sexy, and many companies started to take a new look at the topic of automation under new names like RPA and AI.

We are at a point where even experts struggle to keep an overview of all the different automation solutions on the market. If you are trying to find the right automation solution for your business, this whitepaper will provide you with hands-on guidance on how to navigate the automation solution market. It will help you:

- Find out what you need
- Deal with the jargon, and
- Pick the right solution.

Find out what you need

When choosing an automation solution, you should ask yourself the following questions:

Scale: How often and with how much data do I need to run my process?
Distribution: Where does my process run?
Complexity: How complicated is my process?
Changeability: How likely is my process to change or grow in the future?

Answering these questions will define your basic requirements: what your automation solution has to be able to do. With your requirements in place, you will also be able to get a feeling about how much it will cost you to automate your process(es).

Depending on the nature of your automation, it can cost you anything between € 30 / month and half a day to set up (e.g. for a simple newsletter send-out automation), or hundreds of thousands of Euros and several months to set up, with thousands of Euros of monthly cost to keep it running (e.g. for a custom-built content recommendation system).

Cost

Your requirements drive two cost dimensions: Set-up (CAPEX) and operation (OPEX).

Set-up: How much time and money am I willing to invest until I have my first process automated?

Distribution and complexity directly influence your set-up cost: the more distributed and complex your processes are, the more you will have to invest up-front to automate them.

Operation: How much time and money am I willing to invest in continuously running automated processes?

Scale and changeability directly influence operational cost: if you need high scalability and high changeability, it will be more expensive to run your automated processes.

Being aware of the cost drivers of automation projects is important when choosing a vendor. It allows you to know what you can realistically expect, and where you might have to compromise. You can also check a vendor's credibility by seeing how open they are about the trade-offs you face when choosing their solution: the perfect solution doesn't exist and you should make a conscious decision on where you accept trade-offs.

Glossary: Description of Dimensions

This glossary explains the requirement dimensions in detail. Feel free to skip ahead to the chapter "From iBPMS to iPaaS: deal with the jargon".

Scale: How often and with how much data do I need to run my process?

Low scale:
A process that needs to be done rarely, and/or with low amounts of data.
Example: Monthly backups.

High scale:
A process that needs to be done very often and/or with large amounts of data.
Example: High-frequency trading.

Keywords and features to look for with vendors for high scalability: performance, scalability, high load, load balancing, high frequency, load shifting, streaming.

Glossary: Description of Dimensions

Distribution: Where does my process run?

Low distribution: A process that runs in one location. Example: Copying of files from one folder to another on one computer.

High distribution: A process that is distributed over many different systems. Example: Reporting process that accesses customer data in on-premise DB, customer data in cloud CRM system, customer interaction data in customer support database, customer interaction data in cloud blob store, and merges them all into a weekly report on customer activity.

Keywords and features to look for with vendors for high distribution: integration, connectors, APIs, REST API, webhooks, cloud and on-premise integration, agentless, remote automation, remote connection, triggers, push and pull, notifications, message handler.

Complexity: How complicated is my process?

Low complexity: A process that doesn't need any processing logic. Example: copying customer's name and email from CRM to marketing tool without any transformation.

High complexity: A process that contains a lot of processing logic. Example: Data preparation process that needs to do many calculations to aggregate data, and which should run only if a very specific set of requirements is met.

Keywords and features to look for with vendors for high complexity: as-code automation, code based automation, customisability.

Changeability: How likely is my process to change or grow in the future?

Low changeability: A process that is set in stone and unlikely to change much. Example: invoicing - unless your company logo changes, your invoices will look the same for months and years.

High changeability: A process that is continuously changing and needs to be adapted regularly. Example: marketing campaigns, which are different in each season, for each product, and based on current trends.

Keywords and features to look for with vendors for high changeability: modular automation, reusable components, extensibility, low maintenance, monitoring, debugging, change management, process versioning.

From iBPMS to iPaaS: deal with the jargon

The technology world is ripe with acronyms and technical jargon. The automation market is no exception. Even terms that have been around a while, such as RPA, are used by different vendors to mean different things.

To help you navigate this jargon jungle, I have come up with six categories of automation solutions that encompass the large majority of the market:

- Task automation
- Process automation
- End to end automation
- Custom development
- Integration
- AI

I have added “related keywords” to each of the categories. These can help you place vendors into categories. Not all vendors fit into these categories neatly, but they do help to know where approximately a vendor sits and what you can expect from their solution. This is also supported by the score on each of the requirements mentioned in the first chapter which I have added at the end of each category.

Task Automation

These are solutions that aim to automate the work of a person at a computer. They imitate the way in which a human completes a task, often using the same tools and interfaces as a person would.

A task automation or RPA solution will **be best for you** if you are looking to quickly deal with high workload on very well-defined simple tasks.

It will **not be right for you** if you are looking to build automated processes that you can use over longer periods of time or processes with mid- to high complexity.

Related keywords: RPA, UI automation, click-and-point automation, screen recorder.

Task Automation

Scale: 

In terms of scalability, there is a lot of variation between different vendors.

Distribution: 

Most simple task automation solutions are intended to be used on one single computer. Advanced RPA solutions can run processes across several machines and systems.

Complexity: 

Best suited for **simple tasks**. Often, there is no or only limited ability to define variations in a process. This means that each variation of a process has to be defined separately. Also, they have limited capability to react to errors or changes in the system. For example, when an error message pops up on the screen, they are often not able to process it.

Changeability: 

They are hard to change. Changing a process often means re-engineering the entire process from scratch.

Set-up: 

Task automations are simple to set up. Often, automating a process consists of simply recording your screen while you complete a task, after which the task automation solution can repeat the task for you - much faster.
They can also be set up by non-technical people. RPA solutions in particular have a very clear focus on enabling citizen developers and non-IT people to define automated processes. This means that no coding is required (and often not possible) to automate a task or process.

Operation: 

They are intermediate in operation cost. A simple solution will be cheap to buy and run, but will require regular re-engineering of the process whenever something changes. A more complex solution will be more flexible to maintain, but also more costly to buy.

Process Automation

Process Automation solutions support users in automating processes that consist of several steps. They allow to define a process logic as well as individual tasks that make up a moderately complex process. They imitate the way in which a human completes a task, often using the same tools and interfaces as a person would.

Process Automation solutions often cater to business users and process experts. They support users with great visibility of their process, often in standardised format which is easy to understand. Many process automation solutions started out as process modelling solutions that added automation functionality as an additional feature afterwards. This means that in most cases, projects start with modelling a process and then automating it in a second step.

Process automation solutions can handle more complexity than task automation solutions and usually offer a wider range of functionality. Many (not all) process automation solutions do not aim to fully automate a process but rather expect humans to be part of a process. This means that they offer functionality like forms that allow users to manually complete steps in a process that is made up of a combination both manual and automated steps. Some process automation solutions offer their own set of RPA functionality as a part of their offering.

Process automation solutions are **the right choice for you** if you are looking to automate business processes with moderate complexity that involve a moderate amount of different systems.

They will **not be right for you** if you want to start automating very quickly, as automation projects with such solutions usually start first with modelling the process, and only then adding automation as a second step. This forces users to be very clear and explicit about the process and involves significant effort in the beginning before any automation can even start.

Related keywords: intelligent Business Process Management Suites (iBPMS), Business Process Management and Notation (BPMN), Digital Process Automation (DPA), intelligent process automation (IPA), no-code / low-code automation platform, no-code / low-code application platform.

Process Automation

Scale: 

In terms of scalability, most process automation solutions offer intermediate scalability.

Distribution: 

Most natively support the integration of different software tools into an automated process but rely on pre-built connectors and lack advanced integration features such as integration across network segments (e.g. cloud and on-prem) or the ability to build custom integrations / connectors based on standard APIs and protocols.

Complexity: 

By providing the option to add code snippets, many process automation solutions can handle significant degrees of complexity (though not all offer the option to add code). They are however **not built for highly complex processes** which become cumbersome to edit and maintain through the graphical user interfaces of most process automation solutions.

Changeability: 

Change is reasonably easy to manage: you can edit or swap out components / steps individually. Most lack advanced features like process versioning, support for development and productive environments and release management for processes.

Set-up: €€€

Often require **involvement of technical specialists for setup and the development of automated processes**. Most however are specifically designed to allow non-technical people to collaborate in the design of processes, and vendors often offer full support for setup and initial process development. This increases initial setup cost, but enables you to get started with little involvement of your IT department.

Operation: €€

Operation cost can vary a lot between vendors: there are very powerful open-source process automation solutions, which require high technical skill to operate but come without license cost. There are also well-designed, simple tools that cost a monthly fee to operate, but can be managed without any IT support.

End-to-end Automation

End-to-end automation involves many different solutions and systems, which might include specialised automation solutions and which can reach high degrees of complexity and distribution. They offer integration, process automation, user interaction, task automation / RPA functionality, as well as compatibility with AI. Many enable automation across network boundaries, allowing the integration of cloud and on-premise solutions as well as automation of hybrid cloud systems where your software is distributed across multiple cloud providers.

End-to-end automation solutions are **like swiss knives for automation**: you can automate pretty much anything with a good end-to-end automation solution.

End-to-end automation solutions are **the right choice for you** if you are looking to:

- automate many tasks and processes in your business;
- automate customised / non-standard processes;
- add steps before, after and in between processes which are automated with other automation solutions;
- schedule, orchestrate and monitor any number of processes (**to be used as a central automation and orchestration platform**);
- automate a process that is central to your business, for which there are no specialised automation solutions available.

Since end to end automation platforms allow you to automate any number of processes and tasks, businesses who have an end to end automation solution in use tend to automate the large majority of their processes through this platform. Automating and running an additional process becomes very cheap. This enables you to automate more broadly and improve efficiency throughout your business, instead of just one department or one role.

End-to-end automation will **not be right for you** if you are only looking to automate one process or a handful of simple tasks. The will also not be right for you if you do not have any internal IT support, as most end-to-end automation solutions require at least some technical expertise to set up and operate.

Related keywords: hyperautomation, orchestration, scheduling, event driven automation, workflow management, workflow orchestration, backend automation, rapid application development, code-based automation, API automation.

End-to-end Automation

Scale: 

Most end to end automation platforms are specifically designed to handle high numbers of parallel processes and offer advanced scalability features like multi-instance deployments, automatic scaling etc.

Distribution: 

Most offer advanced integration features by e.g. allowing you to connect to other systems and tools via standard APIs and protocols. This allows you to integrate anything - but requires some effort to do so. Pre-built connectors are often available, but often not a focus of the vendor (since it is anyway possible to connect using standard connectors that you can adapt to your needs).

Complexity: 

This is **the core value proposition of end to end automation platforms**: there is almost nothing you cannot automate with them. They enable you to develop and manage highly complex automated processes.

Changeability: 

Most offer specific functionality to enable change management of automated processes. The quality of these features varies wildly, though. Almost all will support process versioning and offer options for development, test and production setups.

Set-up: 

While some end to end platforms are mighty beasts that are costly and difficult to set-up, light-weight end-to-end platforms are usually offered as SaaS and require nothing more than a signup to get started.

The ratio between set-up cost and benefit is usually very good: automating more complex processes also brings higher benefits.

Operation: 

End to end automation platforms can be expensive, or very expensive. Lightweight platforms offer pricing that is targeted at medium-sized and even smaller businesses. Besides license fees, operation usually requires a technical system administrator.

Custom Development

With custom development, you can automate any process, no matter how complex and distributed it is and how much scalability and changeability in operation you need. It is also the most expensive and the most risky approach to automation. It is expensive because you start from scratch and need to build everything yourself. It is risky because development is really hard and there is a great risk that you will spend a lot of time and money and end up with a custom script that isn't very good.

When starting to automate, many companies choose to write their own scripts to automate some small tasks. While it is rarely the intention to embark on a custom development process, this is often where such projects end up: what started with a small script quickly becomes more and more complex. As companies and their processes evolve, one script becomes many, and they end up with a large number of undocumented, unmaintainable "mini automations" with no central monitoring or visibility of entire process chains and dependencies. The choice to script your own automations from scratch should therefore not be taken lightly.

Custom development is **the right choice for you** if you are building a product with the intent to sell it. No internal processes or integrations should be developed from scratch anymore: it is a waste of time and money, and will result in poorer quality processes than when using a platform that comes with built-in stability, auditability and performance features.

It will **not be right for you** if you have requirements to scale and your know that your processes will change over time. With time, as the business grows, it invariably happens that custom scripts break, and the requirement for more professional management of automation arises. If you opt for an end-to-end automation solution early, you can avoid this pain, which will invariably come your way down the road.

Custom Development

Scale:

Custom automations should be developed to your specifications and therefore offer exactly the degree of scalability that you need.

Distribution:

Custom development is not usually used for distributed processes. When looking to automate a process across different tools and technologies, you should look at integration solutions or end-to-end automation platforms.

Complexity:

There are **no limits to the degree of complexity** that can be realised - this is the core argument for custom development.

Changeability:

Once developed, changing an existing custom process is hard.

Set-up:

This is the most expensive form of automation.

Operation:

A well-developed custom script should be cheap to operate. However, custom development is very hard. Therefore, it is likely that you will have to invest continuously in debugging and extending your custom script.

Integration solutions

Integration solutions automate the exchange of information and data between applications. This is a core aspect of most automation approaches, since most automated processes involve more than one software tool. This means that the challenge of connecting several tools with each other is a part of almost all automation projects.

Different to most other automation solutions, integration solutions **tend to focus less on automating a process** and more on the communication between individual tools and systems.

Integration solutions are **the right choice for you** when you are looking to connect tools with each other, e.g. to make sure that information which is needed in all of them is always up to date and propagated from one system to the next one automatically. They are also a good choice if you have many different places where you need to connect tools and exchange data, which is typically the case once a business reaches a certain size. They are particularly great if you are working with large amounts of data and / or high volumes of data that need to be loaded into different systems quickly and reliably.

It will **not be right for you** if you are looking to automate processes that involve several steps, processes which require interaction with a person, or processes that are moderately to highly complex. What they lack is the overview over a full process. They are also limited in functionality that goes beyond connections and data transformation.

Related keywords: integration layer, integration platform, integration platform as-a-service (iPaaS), API integration, API management, system integration, software integration, service integration and management (SIAM), middleware, extract-transform-load (ETL), data integration.

Integration solutions

Scale: 

This is the core strength of integration solutions: they are **made to efficiently process large amounts of data**.

Distribution: 

Most integration solutions have advanced features supporting integration of systems across networks and technologies.

Complexity: 

Integration solutions are usually **poor in handling processing logic beyond data transformation**.

Changeability: 

Mostly because there is very limited process logic, changing an integration is often possible with little effort. A common limitation is that changes in third party software - the software you want to integrate with - break an integration process. Features to support you to quickly spot and easily remedy these kinds of changes vary a lot between different integration solutions.

Set-up: € €

Operation: € €

There are very different integration solutions, ranging from simple web-app integration tools with drag-and-drop graphical user interfaces to enterprise-level iPaaS tools that need weeks of work just to get started. As a rough guideline: the more data you need to move, the more expensive it will be to set up and operate.

Artificial intelligence

Artificial intelligence (AI) is nowadays used for a range of technologies which use large amounts of data to discover patterns. AI enables the automation of tasks which were previously reserved for humans because they require a form of intelligence or insight which was, until recently, not available to computers.

AI allows the automation of very specific tasks, such as customer support via chatbots, estimation of deforestation through automatic processing of satellite images or recommendation of content or products on platforms like Netflix and Amazon. Each AI algorithm has its own applications, which are usually very narrowly defined based on the type of data available.

There are some pre-packaged AI products available, such as image tagging APIs or speech-to-text APIs. Businesses can subscribe to such an API and, for example, send images and receive appropriate tags for that image. Custom-built AI algorithms require businesses to own large amounts of data which can be used for model development.

As an automation technology, AI can be seen as an extension of existing approaches which allows to add specific capabilities to an automated process. An AI algorithm can automate a specific task, but never a full process.

AI is **the right choice for you** if you are looking to automate a very specific task that only an AI algorithm can solve, such as image tagging or speech processing.

AI will **not be right for you** if you are looking to automate a process that is rule based which could be fully or mostly automated using a standard automation tool. Since AI is still a very expensive technology, it should only be used when you have no other option.

Related keywords: machine learning (ML), Data Science, Data Engineering, image processing, speech-to-text, natural language processing (NLP), chatbots, content recommendation, clustering.

Artificial intelligence

Scale: 

The scalability of an AI depends on the type of AI you use, and how it is set up. Typically however AI is expensive, and scalability therefore will also be costly - but possible.

Distribution:

AI models are often fed with data from many different data sources. However, it is usually not the AI itself that manages the distributed data pipelines, but rather specialised integration solutions.

Complexity: 

AI is used only where things get really complex. However AI can handle only very specific types of complexity.

Changeability: 

AI is highly specialised. Changing an existing AI model requires retraining the model with large amounts of data, which is costly.

Set-up: 

AI is probably the most expensive type of automation in set-up - unless you use pre-packaged AI products, which are still expensive, but at least fairly easy to use.

Operation: 

To ensure that AI models work over longer periods of time requires regular retraining, which requires experts and lots of data. Vendors of AI products (e.g. chatbots) often take care of this for you (and charge you accordingly for the use of their product).

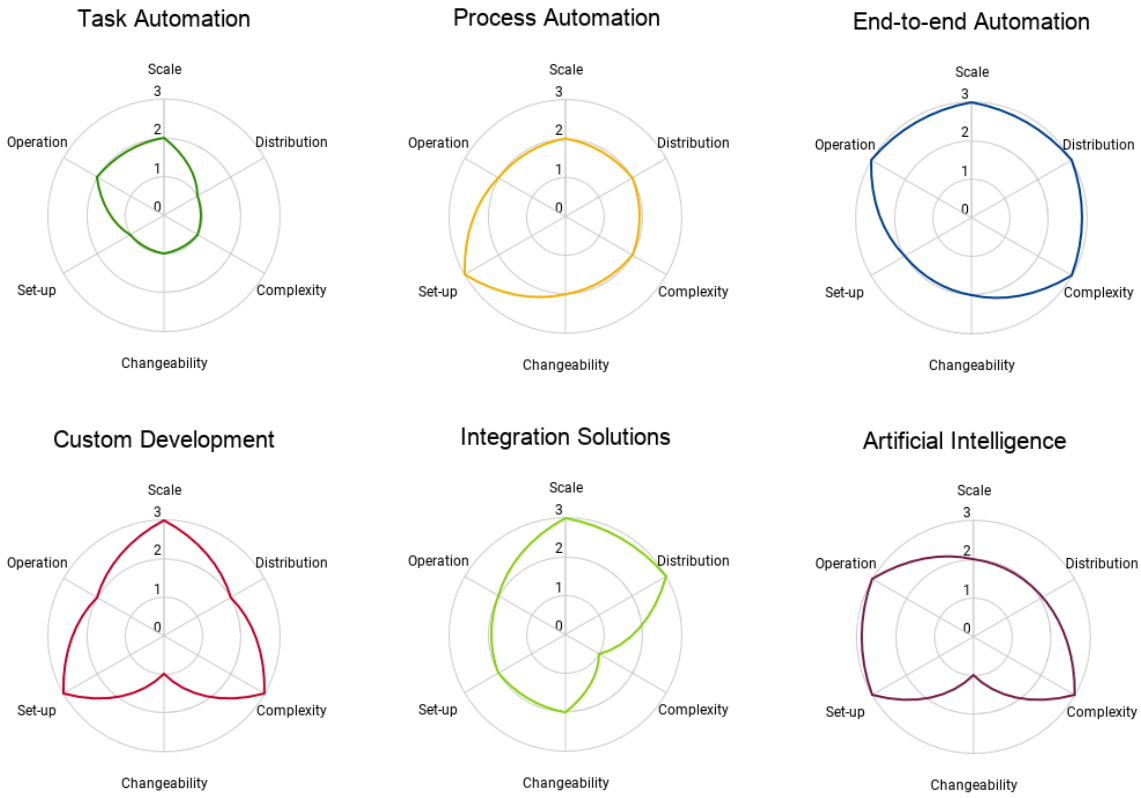
Comparison of Automation Solutions

	Task Automation	Process Automation:	End-to-end Automation	Custom Development	Integration Solutions	Artificial Intelligence
Scale:	★★☆	★★☆	★★★	★★★	★★★	★★☆
Distribution:	★☆☆	★★☆	★★★	★★☆	★★★	☆☆☆
Complexity:	★☆☆	★★☆	★★★	★★★	★★☆	★★★
Changeability:	★☆☆	★★☆	★★☆	★☆☆	★★☆	★☆☆
Set-up:	€	€ € €	€ €	€ € €	€ €	€ € €
Operation:	€ €	€ €	€ € €	€ €	€ €	€ € €
Cost-to-functionality ratio:						
Sum of scale, distribution, complexity and changeability divided by the sum of set-up and operation cost:						
	1.67	1.60	2.20	1.80	2.25	1.00

Tips for Choosing an Automation Vendor

- Consider what you need in terms of scalability, changeability, complexity and distribution before you start talking to vendors. Ask them openly about the trade-offs involved in using their solution.
- When comparing solutions, look for an optimal ratio between cost (which should be low) and functionality (which should be as high as you need, but not higher, as more functionality will inevitably cost more as well).
- To get the best cost-benefit ratio, you should always look for the simplest solution that can fulfil your requirements.
- For the specialised scope of data or app integration, integration solutions offer a very good cost-benefit ratio. When you're looking to automate processes, end-to-end solutions offer the best cost-benefit ratio - balancing their higher price-point with convincingly powerful functionality.
- Don’t expect your average IT service provider to have a good overview of the automation market. It is a complex vendor landscape that is currently changing quickly. Either do your own research and talk to more than one vendor, or consider working with an automation consultant.

Graphical Comparison of Automation Solutions



Summary

- Choose a task automation solution (e.g. RPA) if you want to automate simple, repetitive tasks with low complexity.
- Choose a process automation solution if you want business users to collaborate in defining your automations.
- Choose an end-to-end automation solution if you are looking to automate several processes and you see automation as a strategic topic in your company. There are lightweight code-based end-to-end automation solutions that are great for small and medium sized business.
- Choose custom development if you need to automate a unique and complex process that is central to your business and cannot be realised with standard software.
- Choose an integration solution if you only need to connect applications with each other or if you want to only transport data.
- Choose an AI solution for automating specific tasks like image tagging, chatbots, speech processing, or other tasks that can only be solved by an AI algorithm.

Cloudomation

Taking care of the routine so you can innovate

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