

Robotics Process Automation: Artificial Intelligence with SAP

Rajesh Azmeera

Technology Professional, Department of Information and Technology, Stryker, US (Corresponding Author)

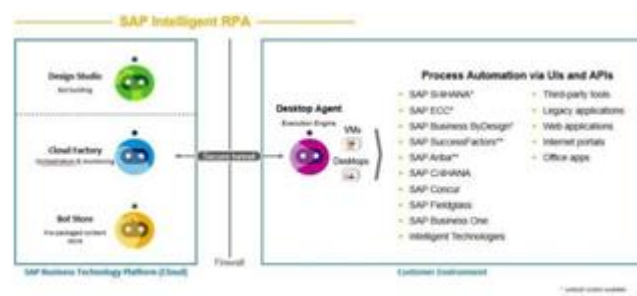
Abstract: SAP Intelligent Robotic Process Automation lets you automate enterprise business processes. Design process automations within the Cloud Studio by creating end - to - end workflows. Generate packages from these automations into the Cloud Factory powered by SAP BTP to configure and execute these packages with Agents. Agents running on workstations can work as a digital assistant (attended automation) or as a digital worker (unattended automation). SAP Intelligent RPA enables business users and technologists to become citizen developers. With powerful yet intuitive low - code and no - code capabilities, the solution supports you in driving automation by tapping into the expertise of citizen developers.

Keywords: SAP Robotics Process Automation, SAP, Artificial Intelligence, SAP Automation and SAP BTP.

1. Introduction

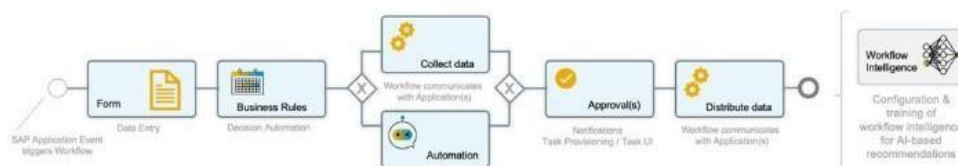
In this article, we will expand on the new capabilities with SAP Intelligent RPA giving you a complete cloud experience, simple interactions for business users and Low Code / No Code bot building experience. Simple browser - based bot building for citizen developers with drag and drop editor, workflow builder, process recorder and event - based capture for bot building.

SAP Intelligent Robotic Process Automation (RPA) bring efficiency in processes across the business operation with high volume transactions. SAP Intelligent Robotic Process Automation (RPA) can handle process steps multiple times such as data entry, report generation and accessing multiple applications during process execution, e. g. web application, SAP S/4HANA Cloud ERP or non - SAP systems.



Process Automation is at the core of cloud business applications, therefore we bring the latest innovation with SAP Process Automation that combines established Workflow Management and Robotic Process Automation capabilities to enable processes with automated application service invocations or event handlers, manual forms - based steps for data collection and multi - step approvals.

SAP Process Automation simplifies process automation with visual drag - and - drop tools. Business users can now build workflows as well as automate tasks and decisions with ease and, if needed, collaborate with development teams to meet all their automation needs.



Future innovation with SAP Process Automation will enable automated bots, dynamic business rules and embedded intelligence from AI Services.

Latest release updates provide three important components that are newly added to SAP's Intelligent Robotic Process Automation to drive efficiency for autonomous intelligence.

1) Cloud Component Improvements

Productivity improvements on SAP Document Schema management

Enhanced usability and flexibility by creating a single data type for each document schema regardless of the number of

document templates created. You can enhance your automation experience, as you can now work with different templates, but the extraction Schema remains the same.

Field preview in document schema selection in Cloud Studio allows the preview of the available fields when creating a document template from an existing schema to better understand the content inside the schema.

Centralized monitoring of raised alerts in Cloud Factory

Gain efficiency when monitoring alerts raised during job execution with the new Alert Logs table in Monitoring with

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centralized alert information and avoid navigating to job detail page for each alert and avoid creating alert handlers (when not needed).

2) SDK Activities

New Activities in PDF SDK to extract PDF by Page Range to take an existing PDF file, split it according to the page numbers that are input, and outputs a new file or overrides the initial PDF file with only the selected pages.

Top 3 business driven innovations that automate your business processes using SAP Intelligent Robotic Process Automation capabilities with #S4HANA #Cloud providing intuitive User experience with the new Cloud Studio.

Digital Automation for Procurement: Manage Catalog Items from Excel (529) Digital Automation for Manufacturing: Post Goods Movement (4FP)

Digital Automation for Sales: Automatic Creation of Sales Order Requests from Unstructured Data (5LT)

Let's take deeper look at the First business driven innovation for Procurement using SAP Intelligent Robotic Process Automation content with SAP S/4HANA.

3) Digital Automation for Procurement

Catalog Manager or Purchaser maintains the catalog items for purchasing on a daily basis. SAP Intelligent RPA bot reduces the manual effort by automatically creating the catalog item into system, thereby increasing the accuracy and productivity. This use case helps automates the creation of Catalog item in SAP S/4HANA system using Excel as a source and Fiori app "Manage Catalog Items".

SAP Intelligent RPA Bot built with Cloud Studio 2.0 in this release provides the below capabilities in manufacturing process. Ability to creation of catalog Items from Excel at one time.

Useful for procurement processes that can help purchaser with operations for catalog items search by using catalog management for purchasing.

Ability to have bot pick only those catalog items which are marked relevant for update/deactivation and perform the action.

Let's take deeper look at the second business driven innovation for manufacturing processes where the SAP Intelligent RPA bot is built with Cloud Studio 2.0 in this release

4) Digital Automation for Manufacturing

SAP Intelligent RPA Bot built with new Cloud Studio 2.0 version in this release help with simplify goods/materials movement process.

SAP Intelligent RPA Bot provides an efficient way for stock transfer and transfer posting of stocks within plant and storage locations. It saves a lot of time to the warehouse clerks who have to keep track of the movement of the goods from warehouses and plants and maintain the stock records intact. The output of each order can be tracked in a

spreadsheet and submit the Goods Receipt for multiple orders in one request. This bot functions in the SAP S/4HANA system and automates the records of the material movement.

Communication Scenario has to be set up in S/4HANA system for the Material Document Integration (SAP_COM_0108). See for more detail documentation here and SAP help documentation URL.

Digital Automation for Sales: Automatic Creation of Sales Order Requests from Unstructured Data (5LT)

Sales order processing constitutes a very important part of the order - to - cash process for enterprises. Internal Sales Representatives get order requests through unstructured files like pdf or pictures attached in the e - mails sent from customers.

SAP Intelligent RPA bot monitors the incoming e - mail with the order request in the form of attachment. SAP Intelligent RPA scans the Inbox and find the mails that include the defined keyword, it extracts the file from the Inbox and uploads the file into the SAP S/4HANA system.

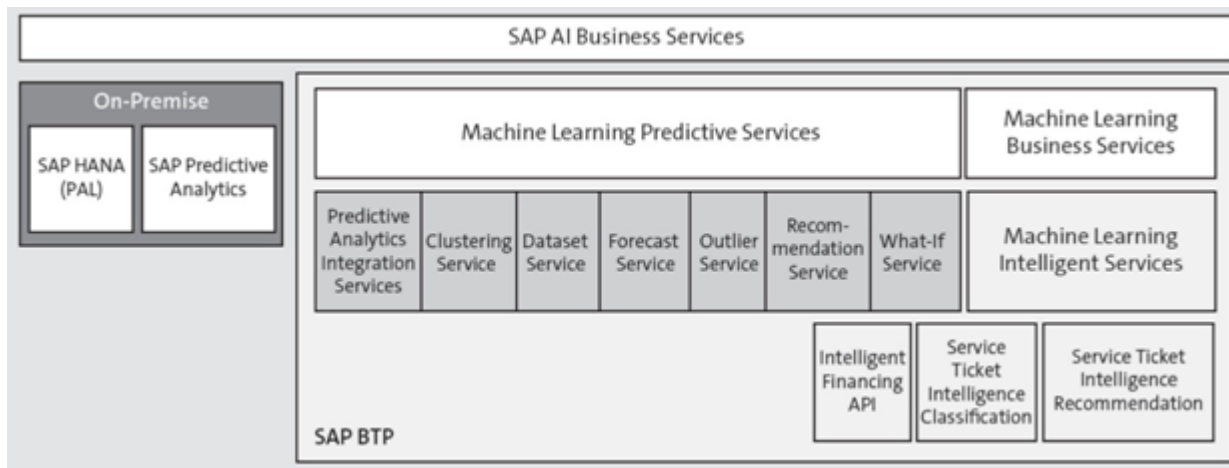
SAP Intelligent RPA bot leverages a machine learning based recognition engine, based on SAP's Document Information Extraction service to extract content from an unstructured source format (email, pdf etc.) and creates a sales order autonomously there by ensuring cost savings by reducing manual effort to create sales orders and improvement of data quality by sales order process automation.

5) Artificial Intelligence

Embedded into enterprise systems, artificial intelligence (AI) and machine learning let customers augment and automate repetitive tasks and unlock entirely new kinds of digital innovation by learning from data, rather than programming explicit rules.

Natively integrated into SAP applications, cloud, and business networks, AI ensures that digital intelligence can be easily consumed across the entire business to create better customer service, optimize business operations, improve employee job satisfaction, reimagine existing business processes, and more.

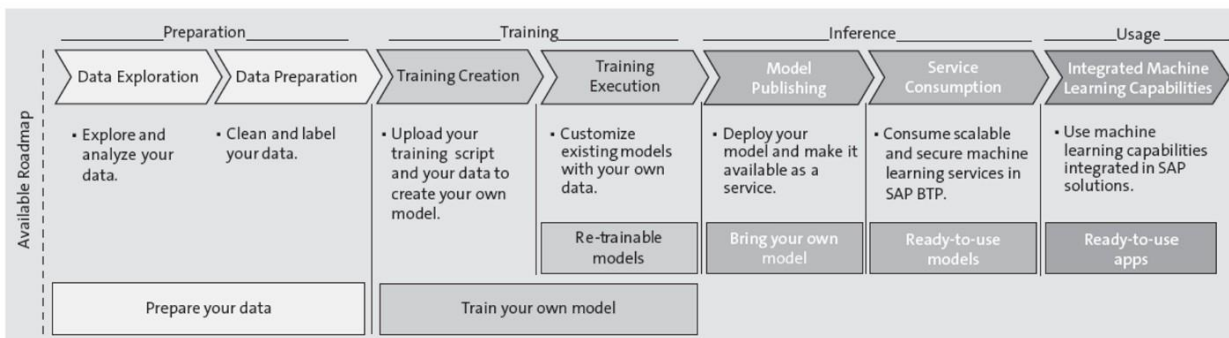
It ranges from well - established product offerings, such as SAP HANA's Predictive Analysis Library (PAL) and SAP Predictive Analytics, to services offered through SAP AI Business Services.



6) SAP AI Business Services Powered by Data Intelligence

This application provides an enterprise - grade platform for machine learning in the cloud. It enables simple consumption and tight integration with SAP’s enterprise software combined with openness toward various machine learning technologies. Developers can benefit from a

scalable and secure platform to augment business processes with machine learning technology and to infuse applications with intelligence. SAP AI Business Services allows you to deploy, publish, and run a machine learning model as a service. The lifecycle of the machine learning model is shown in the figure below.



SAP Conversational AI

Formerly known as Recast. AI, this is the leading AI bot platform for enterprises. With more than 30, 000 developers building more than 60, 000 bots, SAP offers a world - class technology, an end - to - end bot platform, and off - the - shelf customer support bots to lead the revolution of customer relations around the world and enable the intelligent enterprise. SAP Conversational AI can be used to integrate with multiple platforms, such as Facebook, Twitter, Slack, and so on, to create seamless social connectivity.

This is the first step toward a digital assistant, and it supports daily tasks by offering relevant action options based on the consumer’s role, context, and business situation. For example, it allows the user to search for business information or chat in business context with experts to help find solutions to a current problem. Based on the context of the screen, a user can create, collect, and share artifacts such as notes, objects, messages, screenshots, and quick actions. Features of SAP Conversational AI include the following: Digital assistant: Advancements include natural language interaction (NLI).

Notes and screenshots: Create notes and capture screenshots from apps, and then navigate to the app from the screenshot. Annotations can be added, and areas can be blacked out.

Recognizing business objects: Business objects within the current application context as well as those referred to in notes or chats are recognized.

In - context chat: Chat with other users from your business application context, sharing notes, screenshots, and business objects. You can also save the conversations for later use.

SAP Intelligent Robotic Process Automation

SAP acquired Contextor SAS, a European leader in the design and integration of robotic process automation (RPA), to help SAP accelerate the development and expansion of its SAP Intelligent RPA portfolio. RPA is a software robot (also called a bot or digital assistant) that is executed on the end - user’s machines or servers and either in the foreground or background. These bots are mainly used to automate labor - intensive, monotonous, and repetitive tasks to give end users more time to perform higher value tasks.

SAP Intelligent RPA provides traditional RPA capabilities along with seamless integration possibilities with technologies such as SAP Conversational AI, SAP Workflow Management, and various other services (e. g., document processing and machine learning models). It enables expert developers, citizen developers, and business process experts to build bots in the following ways:

- Allocating more effort toward higher value - added activities
- Addressing the problematic issue of staff attrition
- Saving money as RPA software can cost less than employees for comparable workload
- Avoiding errors as RPA tools don't make keying errors
- Time stamping, tracking, and auditing automated work
- Reducing the need for multilingual capabilities
- Providing agility and resilience to support strategic initiatives, for example, moving to SAP S/4HANA
- Increasing compliance and analysis capabilities
- Designing RPA tools to operate 24/7

The overall architecture of SAP Intelligent RPA contains three components: Development Studio

This is the development environment for building bots. Initially only a desktop version of the studio was available, but a more improvised cloud version is now available. This is a low code/no code infrastructure and SAP's long - term investment strategy for the bot building environment. To understand the intent behind having a cloud studio, you need to understand the word "hyper automation," which means finding automation everywhere: in every company, every LoB, and every industry; for everything: every technology is a candidate to be automated; and, of course, for everyone: business analysts, citizen developers, or bots expert developers. Everyone will be able to build their own bots.

Desktop Agent

This is the application to be installed on the end - user's machine. The bot execution, be it attended mode or unattended mode, happens via this component.

Cloud Factory

This is the central component in the overall architecture of SAP Intelligent RPA. This is where the bot administrator will configure, schedule, monitor, and orchestrate the bots to the end - user's machine. The most differentiating factor between SAP Intelligent RPA and other RPA products in the market is the Bot Store, which is also an embedded component within this cloud factory. The Bot Store provides ready - made bots for processes in SAP ERP as well as in SAP S/4HANA. There are multiple standard bots in almost all Lobs. With every passing quarter, the count of these standard bots increases. The activation of these bots is very easy with a complete menu - driven approach of their deployment.

Let's take a closer look at your development studio options, starting with the desktop studio. Though the desktop studio has a wide range capability, building bots equally require technical acumen in JavaScript and understanding the overall framework from a functional and technical events perspective. Despite the auto code generation as a feature, it's advisable to be ready to get deep into JavaScript to understand the framework and build bots.

Alternatively, with the intention to automate the simplest of the tasks and to enable the real end users to start building bots for themselves, SAP came up with the cloud studio, which is released as a low code/no code environment. Cloud

studio is a browser - based environment and tight coupled with your cloud factory component. The bot - building experience is substantially enhanced with the following:

- No low/low code approach for building automations
- Seamless collaborative bot building
- Enhanced and simplified testing tool user experience
- Auto detection of the user interface (UI) technology during screen capture
- Improved screen capture and workflow designer UX
- Deeper understanding of filter criteria via validations within the document object model (DOM) structure
- Completely automated package generation and deployment because the cloud studio is the orchestrator for cloud factory Now, let's walk through some key capabilities of SAP Intelligent RPA bots:

Manage Payment Advice

This is an intelligent automation utilizing the standard machine learning model delivered as part of SAP Cash Application.

It basically automates the process of importing the payment advice files to the system for different company codes and then triggers the notifications to the user with the payment advice number and status in a Microsoft Excel file to ask the user to confirm the payment advice.

The bot is a thorough example of how intelligence can be derived by making the bot work with daily - use applications, such as Outlook, Microsoft Excel, Microsoft Windows file browser, and PDF documents.

Create Supplier Invoices from Spreadsheets

The bot can automatically fetch a variety of source files and convert the source files to destination files with a unified format that the bot can recognize. Afterwards, the bot will create supplier invoices via the Supplier Invoices - Create, Read, Release, Reverse API and can also upload additional attachments via the Attachments API. This can avoid manual work and reduce human errors.

Automated Upload of General Ledger Entries

Automated Upload of General Ledger Entries can automate the upload of manual general journal entry vouchers into SAP S/4HANA. It can substantially reduce the time required and provide file tracking to ensure that all files are both uploaded and posted.

The RPA bot, in step 1, will scan through your inbox for a specific subject line variant, pick up the attached files, and save them in a specific folder (root folder) on your local machine. As part of step 2, the bot will pick those files and process them into SAP S/4HANA. Upon completion, the bot will then create appropriate success and results folders and create the files based on whether the processing was successful or erroneous.

This way of working, where the bots create folders for each of the steps, is also a systematic approach so that you can investigate at the folder level whether something isn't working as expected.

Automatic Creation of Sales Orders from Excel

This API - based bot simplifies the task for internal sales representatives immensely. Most of the time, the internal sales representatives have to create sales orders manually and individually in the system based on the received spreadsheets. This is a very time - consuming and error - prone process, which adds unnecessary manual effort and poses potential risks to the business. This bot automates the task and relieves the internal sales representatives of the manual work.

This bot imports the spreadsheet from a predefined folder to the SAP S/4HANA system and sales orders are created automatically. When sales orders are created, relevant sales employees and their customers will be notified automatically through email.

Artificial Intelligence in SAP S/4HANA

How do the SAP AI Business Services capabilities fit into the backend processes of SAP S/4HANA? SAP enables its customers to reimagine the backend processes more efficiently, more securely, and more transparently as a new solution or as a middleware intelligence product. Singular business processes that can have a heavy impact in each business segment are coupled with machine learning to make them more intelligent and autonomous. Some of the examples are as follows:

Procurement

Goods and services classification, product category normalization, invoice payment block, and image - based detection of invoice.

Sales and Marketing

Brand impact analysis, quotation conversion probability rate, customer retention, sales forecast, selling recommender, and more.

Operations

SAP Predictive Asset Insights, quality inspection through image processing, and stock substitution. Finance SAP Cash Application, accounts payable, remittance advices, cash and liquidity management, dispute proposal, and cash collection reminder. SAP Cash Application automates the process of matching incoming payments to open receivables, reducing the time required.

Service

Conversation commerce, service ticketing, customer support, and solution recommender. Service Ticket Intelligence builds a model based on successful past ticket completion, using it to automatically categorize service tickets and provide recommended solutions to service agents.

Human Resources

Learning recommender, career path recommender, simultaneous training content translation, job standardization, and resume matching.

Master Data

Semantic search, text analysis on master data, business rule mining, and deduplication of records.

2. Limitations and Future Study

AI with SAP is going to be revolutionary in world's science and technology. Master data, Human Resource, Finance, Service Sales and Distribution, Procurement all modules can be integrated with AI but for now it has a limited study and much more should be explored.

3. Conclusion

One important piece of an intelligent enterprise is utilizing artificial intelligence to streamline processes and free up human labor for other tasks. This blog post introduced you to the artificial intelligence capabilities for those running SAP.

Declarations

Ethics approval and consent to participate: Not Applicable

Consent for publication: All authors have consent to submit this paper to Journal of Cloud Computing. Also, we confirm that this paper or any part of this paper did not submit anywhere.

Availability of data and materials: Not Applicable
Competing interests: Not Applicable

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