Market Guide for Service Orchestration and Automation Platforms

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Automation strategies to cope with event-driven business models and cloud infrastructures continue to evolve. Infrastructure and operations leaders must use platforms for service orchestration and automation to deliver customer-focused agility as part of their cloud, big data and DevOps initiatives.

Overview

Key Findings

- Traditional workload automation strategies are unable to meet the needs of evolving IT environments, which include cloud-native infrastructure, edge and Internet of Things deployments, and big data workloads.
- Digital business requires teams, inside and outside of IT, to embrace the real-time, event-driven orchestration of business services.
- Improved efficiency remains a key driver for investments in I&O automation and cost optimization.

Recommendations

Infrastructure and operations leaders who want to transform IT operations automation should:

- Improve efficiency and agility by orchestrating IT processes across multiple services, using service orchestration and automation platforms.
- Drive collaboration across business and IT teams by democratizing access to automation through self-service automation capabilities.
- Multiply the value of orchestrated I&O automation by implementing service orchestration and event-driven workflows to drive business agility and digital innovation.

Strategic Planning Assumption

By year-end 2024, 80% of organizations currently delivering workload automation will be using service orchestration and automation platforms to orchestrate cross-domain workloads.

Market Definition

This document was revised on 8 October 2021. The document you are viewing is the corrected version. For more information, see the Corrections page.

Service orchestration and automation platforms (SOAPs) enable infrastructure and operations (I&O) leaders to design and implement business services through a combination of workflow orchestration, workload automation and resource provisioning across an organization's hybrid digital infrastructure. SOAPs provide a unified administration console and an orchestration engine to manage data pipelines and enable event-driven application workflows. Some tools expose APIs and include mobile apps for scheduling batch processes, monitoring task statuses and alerting users when new events are triggered.

SOAPs expand the role of traditional workload automation by adapting to broader use cases and cloud-native infrastructure and application architecture. These tools complement and integrate with DevOps toolchains to provide customer-focused agility, in addition to cost savings, operational efficiency and process standardization.

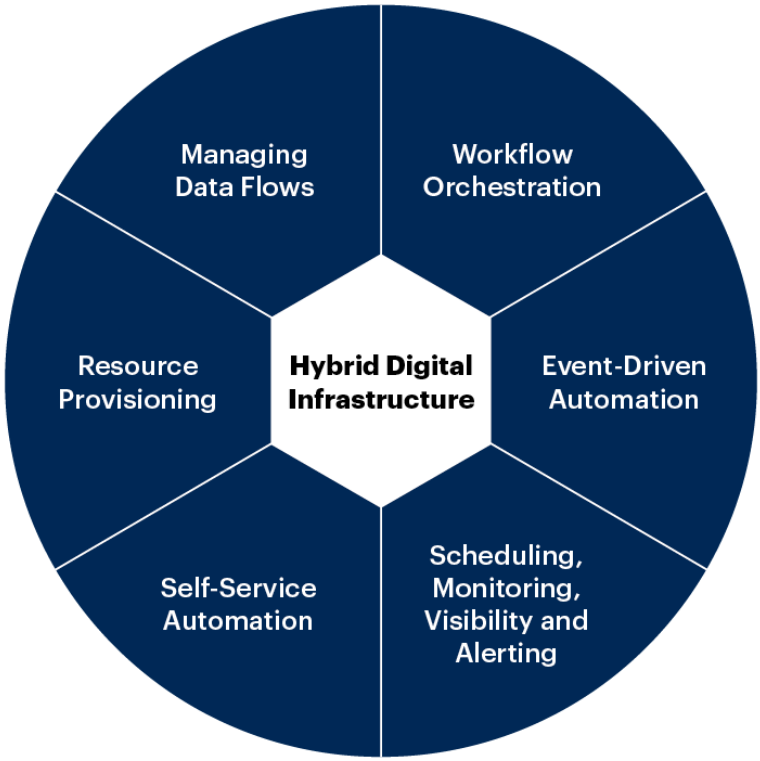
Market Description

SOAPs remain an evolving market, representing the transformation of a mature market for workload automation tools to meet modern infrastructure, application and data requirements. SOAPs represent the evolution of workload automation tools that aim to manage and automate a complete business process. These tools embrace the expansion from foundational, time-based scheduling to event-based workflow orchestration, thus making them better-suited to support real-time, data-processing needs.

IT operations teams, site reliability engineering teams, DevOps teams and dedicated automation teams within I&O are the primary consumers of SOAPs. Some SOAPs provide self-service automation capabilities aimed at business users. The use cases for each team may vary, but, in each case, SOAPs not only eliminate repetitive manual tasks, but also enhance business agility (see Figure 1).

Figure 1: Service Orchestration and Automation Platforms

Service Orchestration and Automation Platforms



Source: Gartner
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As shown in Figure 1, SOAPs have six key differentiating capabilities.

Workflow Orchestration: SOAPs provide a unified view to design and orchestrate workflows across multiple applications, on-premises and in the cloud. These tools typically include a graphical flow designer to design workflows, visualize interdependencies, and connect disparate tasks and data sources.

Example: Use workflow designers to deploy and configure compute, network and storage resources on a public cloud platform. Automation engineers can either use YAML, Python or shell scripting to edit the code behind the workflows and debug the flows before publishing them.

Workflow orchestration has benefits to line of business (LOB) users as well. If a customer interacts with a supplier, not only can it perform the tasks that it was looking to complete without intervention; additional business capabilities can be built. For example, an update to the customer's profile can be automatically created to provide greater insight into the customer profile. Should a problem be experienced, automated triage/information gathering can be executed, and then the results pushed to a customer support team directly via a communication channel, and an update can be provided to the customer.

Event-Driven Automation: SOAPs can automate IT processes that involve manual steps (or require scripting). Some SOAPs allow implementing a sense-policy-respond workflow. This involves sensing an input (trigger), validating against configured rules and policies, and responding by taking appropriate actions. The sense-and-response workflow can use either if-this-then-that logic, heuristics or machine learning (ML) to determine recommended actions.

Example: Resetting passwords, assigning licenses, rotating security keys and creating users. These tools allow the periodic execution of automation tasks or event-based triggering of workflows. Examples of events include new messages in message queues or new files created in the file system that trigger workflow execution.

Self-Service Automation: Give business users, developers and other IT teams the ability to orchestrate their own workflows. SOAPs provide users with a self-service administration console (with role-based access controls (RBAC) to manage the visibility of their automation workflows. This makes IT operations teams more responsive to business needs, while allowing them to focus on higher-value tasks. This also enables the IT organization to maintain visibility into the tasks that are being consumed via automation for efficiency measures and life cycle management of automation.

Example: Support for self-service tasks, from users resetting their own passwords to orchestrating complex workflows, such as initiating an extract transform and load (ETL) job for big data analytics and generating a report from a data warehouse. The goal is to improve user satisfaction without the need to submit and wait for IT tickets.

Scheduling, Monitoring, Visibility, Alerting: Ensure visibility into IT processes and help meet SLAs. Some SOAPs enable real-time service monitoring, alerting and scheduling capabilities via a mobile app. Combined with self-service automation capabilities, users can monitor the status of scheduled workloads in real time and trigger actions should failures be observed. This includes support for traditional, time-based job scheduling, but also more-complex, business-driven scheduling or calendar execution. This enables the plan-predict-optimize workflow for identifying and addressing processes that are in danger of exceeding business SLAs.

Example: Scheduling batch jobs in the cloud that generate reports overnight. The ability to invoke custom logic through function platform as a service (FPaaS), such as Amazon Web Services (AWS) Lambda, Google Cloud Functions and Azure Functions. The ability to batch jobs without having to prepare and scale infrastructure can be one of the salient differentiators for cloud providers.

Resource Provisioning: Provision compute, network and storage resources in the cloud and on-premises. Resource provisioning tends to be platform-specific, and capabilities vary among SOAP providers. SOAPs typically support Windows, UNIX, Linux, mainframes, ERP software (SAP, Oracle), and relational database systems (e.g., Microsoft SQL Server, Oracle and IBM Db2).

Example: Integrate with PowerShell and VMware PowerCLI APIs to automate the provisioning of network, virtual machines (VMs), guest OS, and storage within VMware environments (both on-

premises and in the cloud). Integrate with Terraform and other cloud-specific infrastructure automation tools to automate the creation of staging, testing and production environments as users need them.

Managing Data Pipelines: Automate file transfer and orchestrate data pipelines. A data pipeline is a logical grouping of activities that collectively accomplish a task. The data pipelines can be used to ingest and process data either for batch processing (e.g., Apache Hadoop), streams processing (Apache Airflow) or interactive processing (for example, Apache Spark). Provide the ability to programmatically create, schedule and monitor data flows using a data pipeline. SOAPs must allow these pipelines to be defined as code, so they can be maintained, versioned, tested and integrated with other tools.

Example: Training ML models requires ingesting and cleansing data from multiple back-end sources. This requires orchestrating data pipelines that ingest, prepare, transform and analyze data before being consumed for training ML models. An example of an open-source workflow orchestration platform is Apache Airflow.

SOAPs are available either as SaaS applications or on-premises toolsets. They typically include the following components:

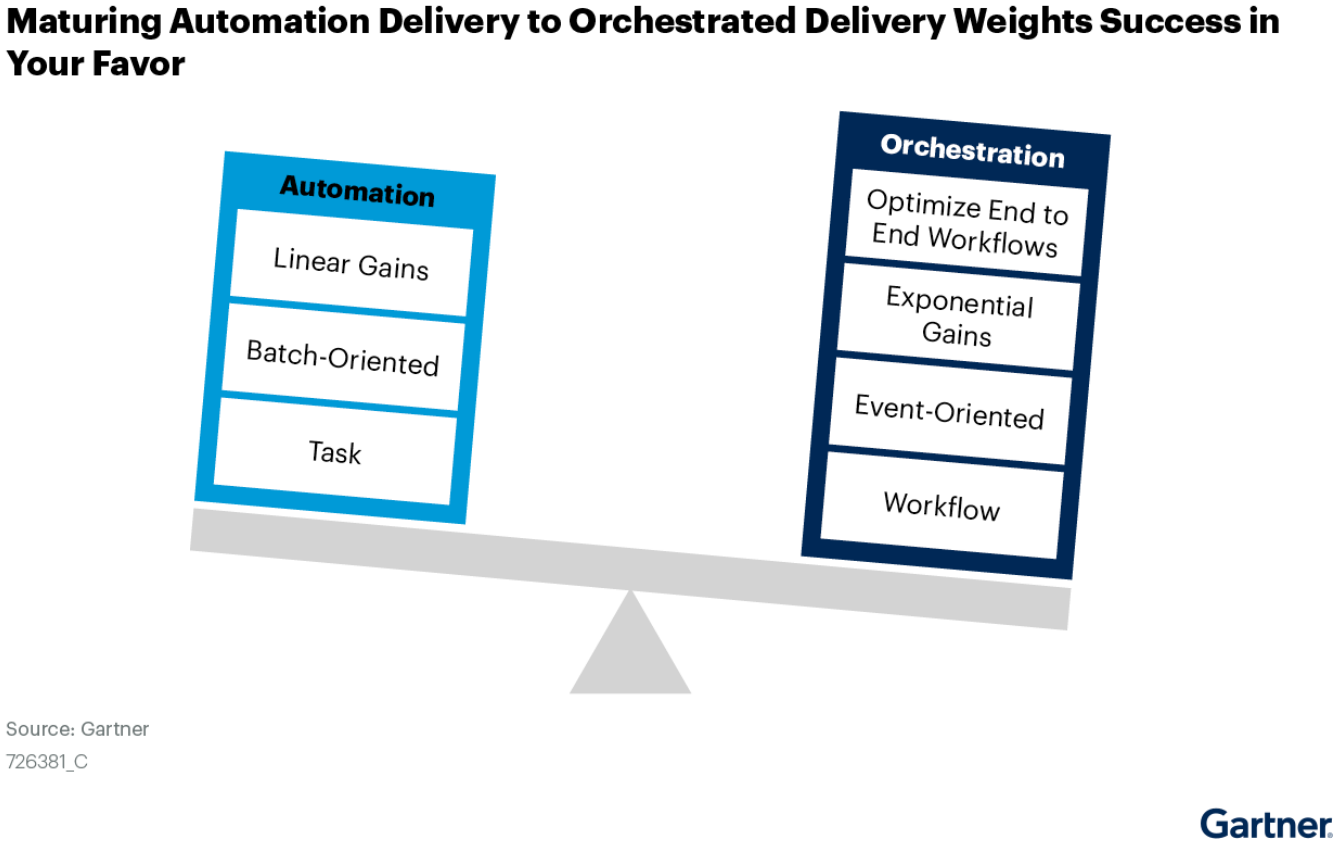
- Web-based administration console with role-based access for scheduling and monitoring status
- Agents for carrying out the actual automation and resource provisioning tasks
- Orchestration/automation/scheduling engine
- Workflow designer to design and assemble business and IT workflows across applications
- A mobile application for users to schedule, monitor and get notified in real time
- Optionally, expose REST APIs to programmatically invoke orchestration and automation capabilities
- Optionally, a self-service console for users to manage their own automation tasks
- Optionally, include support for ML algorithms to drive decisions and take remediation actions

Market Direction

Workload automation tools have their roots in job scheduling to run batch processes such as inventory reconciliation or payroll as a part of a centralized IT function. Batch processing is adequate to meet tactical IT automation requirements for cost savings, minimizing human errors and operational efficiency. However, the pace and scale of digital business means that organizations must shift from a batch mode of operations to event-driven workflows (see Maturity Model for Event Driven Architecture).

Maturing automation delivery to orchestrated delivery weights success in your favor, enabling a rapid response to business demands and exponential benefits (see Figure 2).

Figure 2: Maturing Automation Delivery to Orchestrated Delivery Weights Success in Your Favor



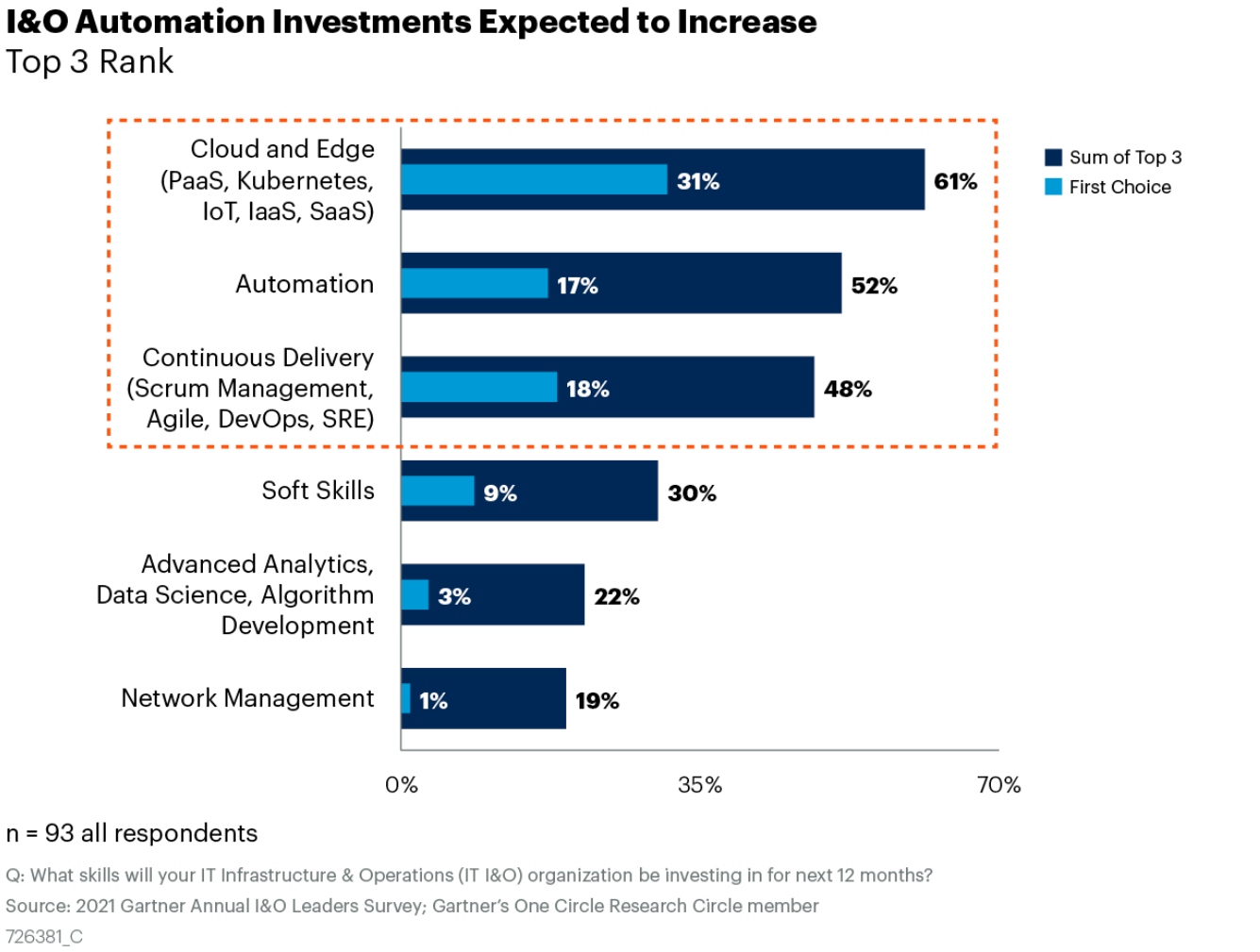
Digital business and digital workplace initiatives lead to two shifts — first, in technology adoption and second, in business operations. Organizations modernize and migrate their applications from on-premises to cloud and container-based environments. SaaS applications (Microsoft 365, Google Workspace [formerly G Suite], Box, Slack, Zoom and others) dominate the digital workplace, have seen rapid adoption, and have exposed additional challenges to efficiently provision and manage SaaS platforms consumption. This challenge is matched by the expansion of the landscape into which I&O must support automated delivery and management. There is rapid expansion in the use of public cloud resources, edge deployment targets, Internet of Things (IoT) and hybrid topologies; using all of these will drive consumption of automation platforms, because they will be unable to scale without them.

The second shift affects the way organizations respond to customer needs. Organizations that respond in a timely manner have a significant competitive advantage over those that do not. This has a ripple effect on foundational IT automation processes. For example, going from analyzing reports at the end of the day/month to streaming analytics and triggering associated actions (via run book automation).

These two shifts are leading indicators of how SOAPs will evolve in the coming years.

In the 2021 I&O Leaders Survey, more than half of respondents said they planned to invest in I&O automation skills during the next year, with 17% ranking this as their first choice of investment. SOAPs orchestrate workflows across IT service management (ITSM), cloud management, SaaS management and configuration management database (CMDB). Therefore, I&O leaders must leverage SOAPs as a force multiplier to extract the maximum return on these investments (see Figure 3).

Figure 3: I&O Automation Investments Expected to Increase



n = 93 all respondents

Q: What skills will your IT Infrastructure & Operations (IT I&O) organization be investing in for next 12 months?

Source: 2021 Gartner Annual I&O Leaders Survey; Gartner's One Circle Research Circle member

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Batch Processing and Workflow Orchestration Capabilities of Cloud Infrastructure-as-a-Service Providers

As workloads shift to the cloud, organizations will seek to benefit from the task automation, job scheduling and API-driven workflow orchestration capabilities of the cloud provider. For batch processing needs, the cloud provider will provision compute resources and server clusters based on the scale of the job submitted. Organizations can take advantage of native-cloud services for planning, scheduling and executing the batch computing workload, without the need to install additional batch processing software.

A salient aspect of the cloud provider's native support for workflow orchestration is being able to connect custom workloads to contingent cloud capabilities, such as serverless (for trigger-event-driven actions) and managed ML services (using the data to train ML models). These capabilities are delivered for the cloud provider capabilities only; spanning cross-provider requires additional investment beyond the native tooling.

Industry use cases include stock trading, inventory and account reconciliation, and drug discovery — all of which involve processing large datasets that are not necessarily present in a single data store. Thus, SOAPs create a data pipeline that can pull the required data together for processing and visualization.

How RPA Tools Complement SOAPs

There is confusion about the diverse types of automation tools and the purposes they serve. For example, infrastructure automation tools, DevOps automation tools and robotic process automation (RPA) tools tend to automate certain aspects of IT processes to enable operational efficiency and business agility. It is important to clarify how they fit into the picture and how SOAPs integrate with them.

SOAPs differ from RPA tools, although there are a few similarities. Both SOAPs and RPA tools move data in or out of third-party application systems and integrate legacy systems with new enterprise applications. However, the differences lie in their intended scope, their complexity and the types of automation problems they tackle. RPA tools predominantly leverage a combination of user interface (UI) and surface-level features to create scripts that automate routine, predictable data transcription work.

Table 1 outlines the key differences between RPA tools and SOAPs.

Table 1: Key Differences Between RPA Tools and SOAPs

SOAPs ↓	*RPA Tools* ↓
Commonly used to automate batch jobs, trigger event-driven workflows or AI-driven actions.	Commonly used to automate routine and repetitive data entry tasks.
The term "service" in the SOAP acronym is more accurately an IT or business workflow.	The term "process" in the RPA acronym is more accurately discrete "task" automation.
Scripts are designed to create pipelines/workflows that use REST APIs to integrate with third-party applications to carry out a logical unit of work.	Scripts are designed to replicate the actions of a person interacting with systems or documents, which typically do not have effective APIs.

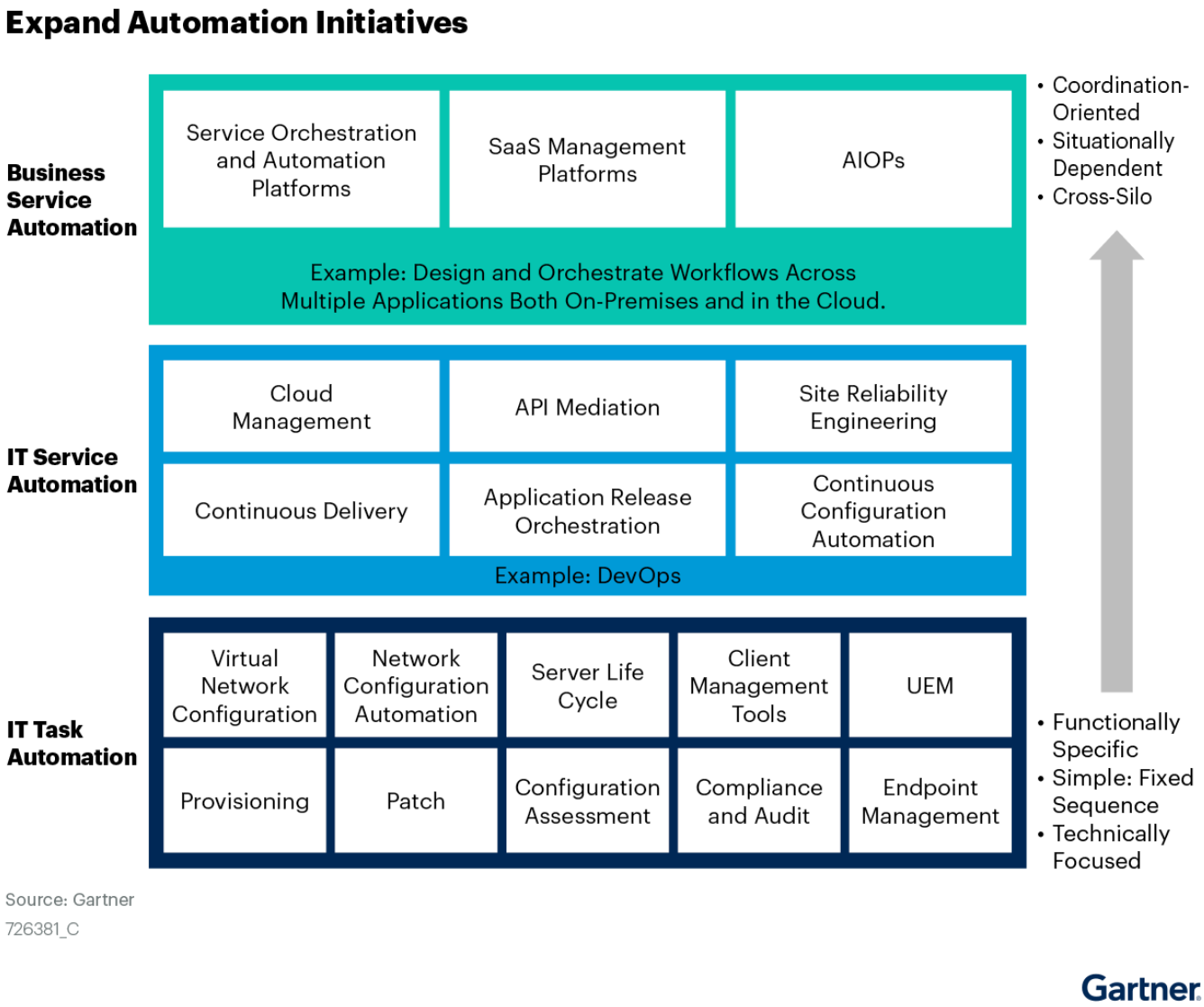
SOAPs	*RPA Tools*
Use case: Automate incident management by analyzing incoming alerts, recommending actions, notifying the right people and closing the ticket when the issue is resolved. RPA tools can complement SOAP to augment capabilities of service desk personnel.	**Use case:** When interacting with customers, customer care support teams often require data from many systems. To improve customer experience and minimize delays, RPA tools automate the routine interaction flows. These flows can be converted later to self-service chatbots.

Source: Gartner (July 2021)

How SOAPs Compare and Relate to DevOps Toolchains

DevOps automation tools aim to automate aspects of software development and delivery. For example, continuous integration (CI) enables automated builds and runs automated tests as part of the process. Continuous deployment (CD) brings consistency, rigor and discipline to the software delivery process. Some SOAPs expose APIs to be programmatically integrated with DevOps toolchains to expose underlying automated jobs that form the foundational business processes of an organization (see Figure 4). They may also extend complementary functionality, such as deploying configuration updates, patches, and log and data management.

Figure 4: Expand Automation Initiatives



DevOps toolchains automate the CI/CD process to rapidly deliver services. SOAPs enable the orchestration of workflows and automation of tasks that use those services to yield innovative business outcomes. Some organizations use open-source tools (such as Jenkins) for CI and existing SOAPs to automate the deployment of artifacts produced through CI. Thus, SOAPs amplify the business benefits of DevOps toolchains.

DevOps requires managing multiple environments, but resource consumption in the cloud can be expensive. What if you wanted to run specific preproduction environments (for example, staging, acceptance test and chaos engineering environments) only during working hours to optimize costs and avoid bill shock? SOAPs include schedulers to schedule uptime and downtime for environments provisioned in the cloud. In this respect, there is some overlap with cloud management platforms (see Magic Quadrant for Cloud Management Platforms).

Programmable Infrastructure

Programmable and immutable infrastructure paradigms involve treating infrastructure as code, so it can be versioned, tested and provisioned on demand. SOAPs that integrate with infrastructure automation tools will enhance business agility and enable I&O leaders to innovate with agile

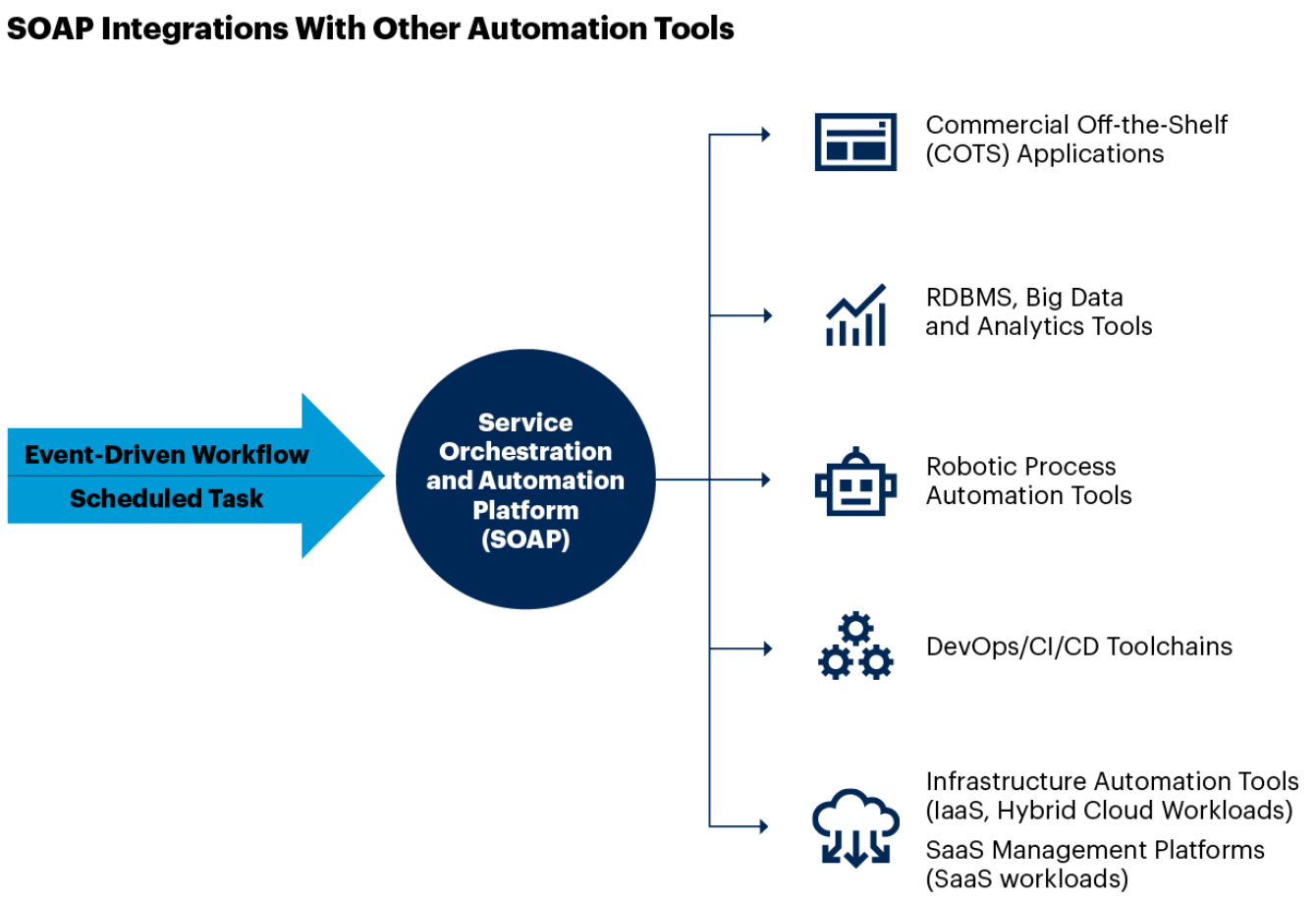
infrastructure. Some SOAPs provide sandbox environments (VMs and containers) to allow the development and testing of scripts before the jobs are deployed to production.

SOAPs integrate with infrastructure automation tools to provision infrastructure resources. They do not replicate this functionality; rather, they complement those tools. For example, SOAPs can use HashiCorp Terraform and Ansible for infrastructure orchestration and configuration management.

Market Analysis

SOAPs will not replace or replicate automation functionality in other domains, such as infrastructure automation, SaaS management, DevOps toolchains or robotic process automation. Rather, they aim to be a single orchestration point to execute, route and delegate automation tasks as needed, both from and to these other domain automation platforms. These platforms are complementary to automation platforms such as digital platform conductors for orchestrating workload placement across a hybrid delivery topology, or RPA platforms for both interaction and API-enablement of legacy systems. These use cases are evolutionary from their traditional uses of automating file transfers, creating data pipelines, scheduling jobs to deploy and run cloud applications, and orchestrating infrastructure as a service (IaaS) and SaaS workflows (see Figure 5).

Figure 5: SOAP Integrations With Other Automation Tools



Source: Gartner
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Automation of Container-Native Workloads

SOAPs will increasingly manage workloads deployed to containers. In some cases, the container image embeds the SOAP agent to manage and monitor the execution of the scheduled task. The tool will integrate with container orchestration engines (e.g., Kubernetes) to launch containers, based on a predefined schedule or event triggers. This integration with containers enables SOAPs to automate workloads consistently across on-premises, private and public clouds.

Minimizing Toil as Part of Site Reliability Engineering

Site reliability engineering (SRE) advocates the elimination of toil by leveraging tools and technologies that automate repetitive, error-prone tasks. Toil can be categorized as manual work that tends to be repetitive and tactical, devoid of enduring value to the service or the customer (see DevOps Teams Must Use Site Reliability Engineering to Maximize Customer Value).

SOAPs can eliminate toil by automating mundane tasks, such as:

- Scheduling periodic system backups
- Software upgrades and system configuration changes
- Response to events (e.g., out-of-memory, out-of-disk-space, high CPU usage)
- Response to security incidents, such as distributed denial of service (DDoS) attacks, ransomware attacks or data breaches

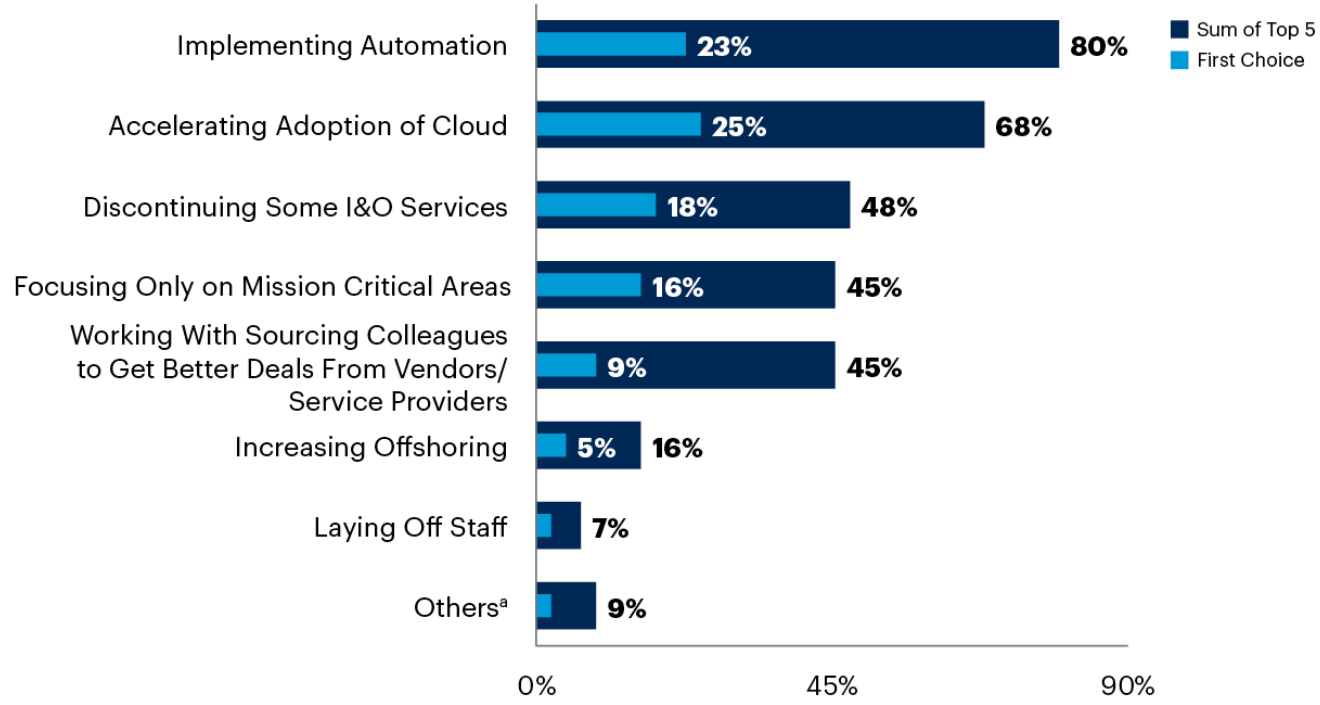
Automation is key to improving response time metrics such as mean time to recover (MTTR) from failures and time to remediate vulnerabilities.

Minimizing “toil” to improve efficiency has benefits in other aspects of IT operations outside of SRE. In the 2021 Gartner I&O Leaders Survey, a majority of respondents selected automation implementation as a key driver for I&O cost-efficiency, with 23% ranking it as the top driver to cost optimization in their organizations (see Figure 6).

Figure 6: I&O Cost Optimization Is Expected to Be Driven Through Automation and Cloud Adoption

IT I&O Cost Optimization Approaches (Amongst Those With Goals to Lower I&O Cost)

Top 5 Rank



n = 44 All respondents with goals to lower IT I&O costs; Excluding unsure

Q: Which of these cost optimization approaches is your organization looking to employ in next 12 months?

Source: 2021 Gartner Annual I&O Leaders Survey, Gartner's One Circle Research Circle members

Note: Values 2% and below are not shown

[a] Insourcing services from high cost or niche providers; Not refilling vacant staff positions; Business IT alignment to ensure ownership at business side too; Make vs Buy decision applied to decide in shoring or offshoring.

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Service orchestration and automation platforms aim to deliver on the promise of efficiency, predictability and scalability of I&O processes.

Audit and Compliance

SOAPs can automate tasks to archive log files and mailboxes for audit and compliance purposes. For example, scheduling periodic transfer of application log files and event logs from production to QA environments can aid with remote troubleshooting without requiring access to production systems. With cloud workloads, detecting "configuration drift" in infrastructure and application settings is paramount to avoiding a data breach.

SOAP as a Service

Most SOAP providers started out as on-premises workload automation tools. However, the increased adoption of cloud workloads has led many SOAP providers to transition to a SaaS model. Security concerns, lack of interoperability, stability and reliability, and the need for increased software engineering skills (the shift to APIs) in I&O teams will be the primary impediments to using SOAP as a service. Public cloud providers, such as Amazon Web Services (AWS), Microsoft Azure and Google Cloud Platform (GCP), provide workflow orchestration, managing data flows and batch processing as a service for their own offerings. The pricing in some cases is not by service, but is based on the underlying compute and storage resources consumed.

Democratizing Automation Across IT

Organizations that are constrained for scripting or programming skills within I&O teams can leverage the graphical flow designer in SOAPs. This democratizes automation across IT and LOBs by taking a “low code” approach to automation. When combined with self-service capabilities, the flow designer enables citizen developers to build their own workflows, thus improving user productivity.

The ability to design workflows using drag-and-drop flow designer tools allows users to define workflows that closely model business processes. Some SOAPs augment flow designers with workflow optimization capabilities that help identify bottlenecks and eliminate constraints in the workflow. Users can leverage prebuilt integrations and avoid writing and testing custom integration code/scripts.

The capability that SOAPs offer for the IT organization to gather telemetry about the scope and use of automation for business-driven scenarios is underappreciated. This enables the IT organization to maintain visibility into the processes that are automated and in use to ensure that compliance with internal policies is maintained. Similarly, ensure that fragility is not introduced into the operating environment by that automation, and identify opportunities to leverage user-created automation across a broader audience. This visibility identifies automation-minded users who can be coalesced into a community of practice (CoP).

Representative Vendors

The vendors listed in this Market Guide do not imply an exhaustive list. This section is intended to provide more understanding of the market and its offerings.

Market Introduction

Table 2 includes a partial list of SOAP providers (see Note 1). Vendors are developing their capabilities at a rapid pace to meet the needs of cloud-based workloads and real-time automation and response. Every vendor has a strength in a certain aspect of SOAP functionality — for example, event-driven workflows, breadth of infrastructure and application integrations, and managing data pipelines.

Open source has been added to this market for the first time. These product offerings range from the core-scheduling capability in the Quartz scheduler project, to a traditional Workload Automation platform (JobScheduler), to advanced, event-stream-driven (StackStorm) and data-driven (Apache Airflow) capabilities. The projects are included as client inquiry has expanded to include offerings outside the vendor-supplier market.

Table 2: Representative Vendors in Service Orchestration and Automation Platforms

Vendor	*Product, Service or Solution Name*
Activeeon	ProActive by Activeeon Workflows & Scheduling
Advanced Systems Concepts	ActiveBatch
ASG	Enterprise Orchestrator
AutomationEdge	IT Process Automation
BMC	Control-M
Broadcom	Automic Automation
HCL Software	HCL Workload Automation
HelpSystems-JAMS	JAMS
Micro Focus	Operations Orchestration
Red Hat	Ansible Automation Platform
Redwood	Business Process Automation

Vendor	*Product, Service or Solution Name*
Resolve	Resolve Platform Pro, Resolve Actions Express (Ayehu)
PagerDuty (Rundeck)	Rundeck
ServiceNow	ServiceNow IntegrationHub
SMA Technologies	OpCon
Stonebranch	Universal Automation Center (UAC)
Tidal Software	Tidal Automation
Public Cloud Service Providers	
Amazon Web Services (AWS)	AWS Batch, Amazon Simple Workflow Service (SWF), AWS Step Functions
Google Cloud Platform	Cloud Composer, Cloud Scheduler, Cloud Tasks
Microsoft Azure	Azure Automation, Azure Batch, Azure Logic Apps, Azure Data Factory
Open-Source Projects	
Apache Software Foundation	Apache AirFlow

Vendor	*Product, Service or Solution Name*
Linux Foundation	StackStorm
SOS Berlin	JobScheduler
Software AG	Quartz

Source: Gartner (July 2021)

Market Recommendations

I&O leaders who want to derive greater business value from IT automation should:

- Prioritize support for orchestrating cloud-native applications and infrastructure during SOAP selection to prepare for cloud migration or integration with IaaS or SaaS workloads.
- Prioritize the depth and breadth of native integrations with existing IT systems during vendor selection to avoid custom modifications to the SOAP during implementation.
- Identify suitable vendors for evaluation inclusion by identifying regional presence limitations, customer support and provider viability.
- Use investment in SOAPs to drive digital innovation and business agility, thus treating automation as a critical lever for infrastructure-led disruption (see How to Lead Digital Disruption With Programmable Infrastructure).

Evidence

Gartner's Annual I&O Leaders 2021 was conducted online from 14 June through 25 June to track burning issues for I&O leaders and where they are prioritizing their investments during the next year. It will also seek to explore investments in cost optimization and innovation strategies. In total, 96 Research Circle members participated, of which 71 were ITL members, 22 were CIO members, two were CSS members and one was a CFO member. Members from North America (45%), the EMEA region (35%), the Asia/Pacific region (11%) and Latin America (9%) responded to the survey. The survey was developed collaboratively by a team of Gartner analysts and was reviewed, tested and administered by Gartner's Research Data and Analytics team.

Gartner's Research Circle members include leaders from:

- Application management

- Data and analytics
- Business process improvement
- Enterprise architecture/technology innovation (EA/TI)
- IT I&O
- Program and portfolio management
- Security and risk management (SRM)
- Sourcing and vendor relationships
- Strategic planning
- Product development and management
- Software engineering

They represent a mixture of industries and organization sizes, with the majority in North America and Western Europe. The results of this study represent the respondent base, not necessarily the market as a whole. Gartner has taken more than 150 inquiries related to the SOAP market in the preceding 18 months prior to publication of this update.

Note 1: Representative Vendor Selection

The representative vendors listed in this research are a subset of the total market. The vendors included here are those that offer most of the critical capabilities of SOAPs and that we have seen clients include in their own vendor evaluations. Some tools are more focused on event-driven workflow orchestration than on time-based job scheduling.