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The Future Of Infrastructure Automation

MANAGE COMPLEXITY, SAVE TIME, AND SCALE FASTER BY AUTOMATING EVERYWHERE

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Infrastructure automation is vital to unlocking efficiency and agility in competitive markets where every second counts. Taking a holistic approach to automation across environments can help save time, improve quality, reduce costs, and enhance collaboration, while minimizing errors and freeing teams to focus on more meaningful work.

"The Future Of Infrastructure Automation" report from Forrester Research outlines its importance as organizations and technologies become more complex, details key trends, and the steps leaders should take to prepare for the future. It covers:

- Current limitations resulting from a lack of automation tool intelligence, automation that has been developed in siloes, and underfunding.

- The potential for infrastructure automation to unite the best of human and machine intelligence.

- Why it's essential that infrastructure automation is smart, consolidated, and confident in the future.

- How AI is pushing the frontiers of automation.

Red Hat® Ansible® Automation Platform is a unified solution for strategic automation. It combines the security, features, integrations, and flexibility needed to scale automation across domains, orchestrate essential workflows, and optimize IT operations to successfully adopt enterprise AI.

The Future Of Infrastructure Automation

Rekindle The Platform, Practices, And Processes Of Automation

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Summary

Infrastructure automation has existed ever since the scale of IT infrastructure surpassed the human capacity to manage it. Its importance is only growing as underlying technologies become more complex and geographically dispersed. In a world that demands immediate IT flexibility and adaptivity, capabilities like provisioning infrastructure have become table stakes, while automated problem resolution and remediation are in demand despite their complexity. The future will be smart, consolidated, and confident. This report details the key trends shaping its future and how technology leaders should prepare today.

Automation Promises To Unite The Best Of Human And Machine Intelligence

The vision of infrastructure automation is to build the optimal combination of AI and human intelligence. Humans bring specific know-how and the wisdom of experience while AI generates quick insights on what to automate, in which scenarios, how, and when. However, there are still several hurdles to this future.

The Current State Is Unintelligent, Siloed, And Underfunded

Tech leaders envision fully automated and proactive technology operations that support the pace of change that businesses demand. To do that, automation must be flexible, integrated, and intelligent. Today's automation doesn't deliver; tools lack the functionality to deliver meaningful results, so tech leaders are wary of significant investment, which prevents progress. Tech leaders want sound, futureproof investments but find themselves limited because:

- **Contemporary automation tools lack intelligence.** Today's infrastructure automation tools do what they are told and report back. For IT organizations optimistically leaning on these systems to support generative and conversational systems, technical automation tools can't deliver because of the lack of data mining capabilities and any intelligence. Vendors will add such intelligence to these tools first, which will be critical as it has become humanly impossible to correlate vast amounts of data and processes.

- **Automation technologies remain siloed.** Server, storage, and network automation tools largely operate in their own domains. Tools like Ansible promise to bring these technology domains together; however, technology heterogeneity, complexity, and speed of change leaves a lot to be desired for coverage and support. Additionally, IT process automation for problem resolution and remediation is limited. Tools like VMware's Cloud Foundation Automation and the Ansible event-driven automation ecosystem have made the most progress. Vendors like ServiceNow help define and lay the processes but do little to integrate across the automation tools ecosystem.

- **Tech leaders underfund automation.** Automation tool investment is mostly ad hoc and rarely organized strategically. Meanwhile, in Forrester's Infrastructure Hardware Survey, 2023, just 25% of global infrastructure decision-makers said that their firm has an automation center of excellence (COE). Automation currently serves static use cases like infrastructure provisioning and change management, but rarely do tech leaders invest in dynamic scenarios like automated resolution. A COE is particularly important for organizations in need of support to ideate, improve

cross-team alignment, and further collaboration and where automation must stitch complex, heterogenous, and disparate systems and processes together. For example, Hotstar has successfully implemented automated remediation because any failure to remediate in real time will ruin its business. Today, this remains the exception.

The Future Is Smart, Consolidated, And Confident

Tomorrow's infrastructure automation will be: 1) smart, packed with insights, self-improving, and with a cross-domain scope; 2) consolidated with tools, teams, and skill sets that break down existing silos; and 3) confident, reliably solving complex challenges and embraced by the entire organization (see Figure 1). When this future unfolds, IT organizations will be able to deliver technology services to their internal and external users instantaneously while complying with all corporate and regulatory policies.

Figure 1

The Future Of Infrastructure Automation Is Smart, Consolidated, And Confident

Today		Future	
Unintelligent	• Automation acts as it is defined. • Limited to traditional reporting. • Tools can't identify the next automation opportunities. • Tools struggle to keep pace of IT change.	**Smart**	• Automation tools can self-recognize what's working and what's not. • Tools self-identify the best use case and scenarios as future candidates for automation. • Tools help push the pace of IT.
Siloed	• Automation tools operate in their own silos (respective domains). • Tool proliferation is common. • More advanced and dynamic use cases remain out of reach.	**Consolidated**	• Automation tools integrate with each other. • Tools expand the scale and collective reach to solve more complex problems.
Underfunded	• Firms underinvest in automation due to multiple challenges including: • Lack of intelligence in tools. • Silos between domains. • Underdeveloped skills. • Tool usability remains wanting. • Limited value due to focus on static use cases.	**Confident**	• Training is funded, building skills across domains. • Center of excellence and automation platform teams emerge. • Ability to solve more complex, multidimensional challenges. • Firms solve frequent, high impact, and high value scenarios. • Firms encourage out-of-the-box thinking and cross-functional collaboration.

Smart: Automation Explores And Surfaces Opportunities For Itself

In the future, AI-fueled infrastructure automation will enable an era of self-healing predictive systems. Predictive use cases like provisioning, patch management, and updates will come first, followed by use cases like automated self-service and problem resolution. Meanwhile, HashiCorp and IBM/Red Hat are building automated code generation capabilities. These capabilities will provide invaluable assistance to IT operations teams responding to and remediating failures and outages. Finally, these solutions will inform IT operations what to automate next by providing insights on which automations would have the largest impact. In the future, tech leaders can expect these solutions to provide:

- **Continuous optimization.** AI within these solutions will enable experiential learning. Far too often, IT organizations develop processes that never change because there is no feedback loop or ability to gather operational insights. As a result, tech pros often have a shallow understanding of the efficiency of automated processes. This problem creates further difficulties when IT pros want to understand cross-domain efficiencies. Built-in AI models fed with the right dataset can learn and refine this understanding, leading to continuous improvement and optimization of automation and efficient use of underlying infrastructure.

- **Insights from their own operations and beyond.** Consider a smartphone running Android OS version 12 onward. It has a built-in program to detect and remove device privileges for unused apps — a simple security automation. Similarly, imagine an automation tool that assesses the effectiveness and efficiency of existing automation. The infrastructure automation solution will analyze its own data to suggest focus areas, including a value assessment for each recommendation. Additionally, it will draw examples from peers and insights from connected systems to help expand the scope of efforts.

- **Data exploration and what-if scenario analysis.** Each silo or domain holds insights, but without integration, it's hard to extract. Silos often lead to duplicate data, manual execution, and handovers as information resides in isolated systems and requires extra effort to share or utilize across teams and departments. Automation can tackle these repetitive tasks, saving time and resources. There are simple yet powerful possibilities that automation tool vendors will develop for tech leaders to leverage — for example, performing what-if analyses before they roll out massive changes.

Consolidated: IaC Reduces The Number Of Domain-Specific Automation Tools

Historically, automation tools are domain focused, and the server world garners the most investment, followed by storage and networks. This forces firms to invest in multiple nonintegrated point tools. In the short term, the vendor ecosystem will advance enough to consolidate to a manageable number, reduce overlaps between tools, develop standardized operations, and reduce cognitive overload. This consolidation was born in the public cloud as organizations expected one solution across domains (e.g., compute, storage, network, database, platforms, and security tools) and between public clouds. In the on-premises world, vendors like Red Hat are working toward consolidation. However, such efforts won't be sufficient; infrastructure as code (IaC) is the factor that will make this a reality. Its prominence is now growing on-premises in areas like provisioning, change control, enforcement, and auditing. Many of these capabilities are the lifeblood of DevOps and public cloud operations. In the future, tech leaders can expect that:

- **IaC will be the de facto standard.** By defining infrastructure in code, tech pros use a common language and set of tools, promoting standardization and automation across different IT domains. For example, IaC could trigger the provisioning of a Datadog instance to monitor an app instance while app owners test it for various scenarios and deprovision it soon after conducting the tests. Likewise, it provisions a load balancer, a web application firewall, and other infrastructure components. HotStar uses all these capabilities to rapidly scale the infrastructure, apps, network, security tools, and configurations up or down in line with user experiences. Today, Terraform is a leading IaC tool, leaning heavily on its network effect and prior open-source status. Open-source projects like OpenTofu are also gaining traction.

- **Cross-domain insights will justify automation COEs.** Despite stated intent, tech leaders haven't made significant investments in automation COEs. However, as they experience the speed, reliability, and quality of automated service delivery from the hyperscalers, they envision building similar capabilities for their own organizations. Cloud providers have been able to build the automation capabilities they need while tech leaders have been limited by the shortcomings of today's solutions. Now, tech leaders can leverage IaC and its network to build world-class automation capabilities and a COE.

Confident: Automation Handles Cross-Domain Complexity And Builds Trust

Tomorrow's tech leaders must be ready to address any scenario in their production environment, regardless of whether it's planned or unplanned, predictable or unpredictable. Some firms have advanced, maturing the infrastructure automation efforts that support their business scenarios: Ride-sharing companies can predict clusters of high-and low-demand zones and adapt to sudden jumps or declines in rider requests based on internal data sources as well as external sources like flight schedules and weather conditions. Other scenarios present a blend of predictable and unpredictable challenges (e.g., a stock exchange must finish end-of-day processing for fraud detection within a specific timeframe regardless of the number of trades on that day; concurrent live viewership spikes during major sports events). IaC is proving to be an active ingredient in the closed-loop automation that serves both remediation and resolution. In the future, tech leaders can expect:

- **Autonomous and predictive management for the entire tech stack.** Automated resolutions must be granular and correspond to each discretely manageable production issue. For example, to improve a degrading user experience, your engineering team needs to automate a certain set of tasks to identify the root cause and trigger remediation. Firms like HotStar are developing closed-loop automation systems for prompt remediations. This boosts rapid testing capability, enhances scenario coverage, and increases confidence in mitigating risks. Automation tools will use cross-domain insights while handling a blend of predictive and nonpredictive inputs for real-time corrective actions. However, your team must identify failure scenarios in advance, enable collaboration, and proactively build automation to establish trust in its resolutions.

- **The ability to flexibly scale up or down as needed.** Businesses must scale up and down as the customer demand changes. Technologies like cloud help do this with built-in autoscaling, but the native autoscaling isn't complete or perfect (e.g., database instances rarely scale with demand). Most notably, it doesn't apply to all platforms or systems that require this scale and flexibility. This is where IaC comes in. Although most tech pros currently use it for rapid and large-scale provisioning cloud infrastructure services, in the future, enterprises will gain confidence in their infrastructure automation as they will be able to develop processes for most scenarios, scale infrastructure in line with customer demands, and remediate issues faster.

- **Orchestration and automation of complex disaster recovery (DR).** Resilience relies on many business and technology techniques. One important key to modern

resilience is the ability to replicate infrastructure specifications from testing through production. Lack of consistent environments leads to application quality and performance issues. IaC platforms capture the configuration for the entire stack and apply it to the provisioned infrastructure, reducing the need for manual intervention and minimizes the risk of errors. The result? Faster delivery times and more reliable systems. Looking ahead, expect infrastructure automation to apply these techniques for more complex process like for automation and orchestration of DR.

AI Pushes The Frontiers Of Automation

AI will be instrumental to the ability of infrastructure automation solutions to become smart, consolidated, and confident. AI accesses knowledge records, real-time monitoring, and internal documents to find out patterns, frequency of requests, changes, issues, and their resolutions. Its ability to connect to and derive insights from these sources dictates how smart automation can be. AI can help integrate various tools and automate workflows, driving consolidation, and reducing the need for multiple tools to perform similar tasks.

AI will continue to push the boundaries of what organizations are capable of at a scale we can only imagine today. Many of today's aspirational automation stories don't come from packaged offerings but rather from organizations that have successfully powered their solutions with greater intelligence. HotStar implemented automation to stream live cricket matches with millions of simultaneous users; Google operates with minimal onsite administrators; and X generates infrastructure code using TuringBots.

AI, Knowledge Management, And Automation Feed Into Each Other

Historically, knowledge management (KM) has not been a priority for organizations. With AI and large language models (LLMs) becoming mainstream, curating knowledge into meaningful answers and net-new generation of assets, KM is suddenly extremely important. Companies are building their knowledge capacity starting with leadership and incentives to spark change. Tech leaders have an immense opportunity to:

- **Use AI to mine knowledge.** Knowledgebase articles often capture information (e.g., process how-tos, incident analysis, root cause) in a nonstandard way; this information is helpful if you can mine it. Identify scenarios, situations, use cases, and tasks to automate. The use of LLMs will be a force multiplier, especially as orgs start to capture tacit knowledge (i.e., the expertise in people's brains, advice, file drawers). To improve automation, assess the frequency and difficulty of resolutions or remediations thus far — whether they've been challenging, straightforward, or

complex have been. Don't restrict to internal knowledge sources; explore the use of relevant external sources from vendors and partners. Use Forrester's framework to identify ripe opportunities for technology automation.

- **Use TuringBots to develop code for automation.** TuringBots, AI-assisted software development, have already gained notable adoption. Tech leaders and their teams use TuringBots to: 1) build pipelines; 2) automate development, security, and operations (DevSecOps) governance policies; 3) build IaC; 4) create playbooks that meet business service-level agreements; and 5) improve cloud development experiences. Many vendors including Amazon Web Services, GitLab, Google Cloud, IBM, and Red Hat offer TuringBots. Automation leaders should identify opportunities to capitalize with TuringBots.

- **Circle back to create additional knowledge base articles.** Existing knowledge articles will only get you so far. Capturing information to create additional knowledge articles is key to infrastructure automation advancement. Enterprise content management tools with robotic process automation capability, offered by vendors such as Hyland and Tungsten Automation, can kick off this effort with screen capture of automation processes. However, as LLMs advance, they will be able to create net-new knowledge articles about experiences, inputs, results, issues, workarounds, and related information. This in turn will feed your models and create a beneficial cycle of improvement (see Figure 2). Automation leaders should identify important and critical processes where additional knowledge documents will enhance business capability.

Figure 2

A Closed Loop Ties Knowledge Management, AI, And Automation
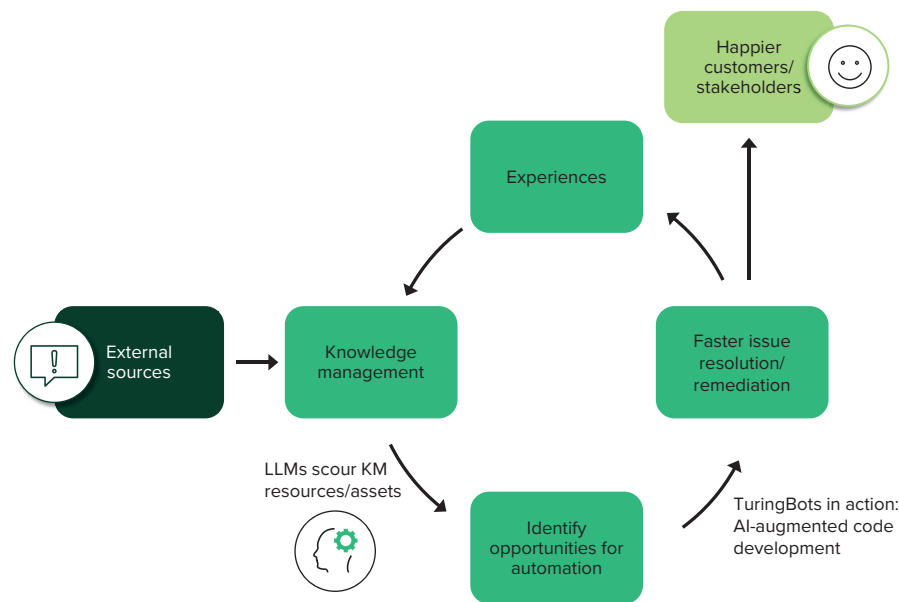
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