The Forrester Wave™: Configuration Management Software For Infrastructure Automation, Q4 2018

The Seven Providers That Matter Most And How They Stack Up

by Chris Gardner
November 7, 2018

Why Read This Report

In our 27-criterion evaluation of configuration management providers, we identified the seven most significant — Canonical, Chef, Microsoft, Northern.tech, Puppet, Red Hat, and SaltStack — and researched, analyzed, and scored them. We focused on core features, including deployment, configuration modeling, automation, monitoring and governance, and community support, as well as on each vendor's ability to match a strategy to these features. This report helps infrastructure and operations (I&O) professionals make the right choice when looking for configuration management solutions for their DevOps and infrastructure-as-code (IaC) automation.

Key Takeaways

Puppet And Chef Lead The Market

Forrester's research uncovered a market in which Puppet and Chef rank as Leaders; Microsoft, Red Hat, and SaltStack are Strong Performers; and Northern.tech and Canonical are Contenders.

Configuration Management Tools Form Part Of A Greater Automation Whole

The greater landscape in this market consists of service, software, and element domains. Within the element domain are provisioning and control subdomains. The vendors and tools we evaluated in this Forrester Wave® straddle these subdomains and are sometimes involved with release management as well.

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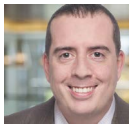

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with Glenn O'Donnell, Charles Betz, Amanda Lipson, Julia Caldwell, and Diane Lynch

November 7, 2018

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Configuration Management Delivers On The Promise Of IaC

It's no longer possible to manage infrastructure manually. In a world of infrastructure-as-code, where systems can be spun up and decommissioned in minutes or seconds, robust automation is essential, and configuration drift and compliance become real issues.[1] As infrastructure and application development converge, the rapid delivery of consistent, reliably configured infrastructure has become critical to I&O success and foundational to successful DevOps.[2] To achieve the required speed of innovation, I&O professionals must adopt a structured approach to delivering software-defined models across the complete life cycle.

The tools in this Forrester Wave are colloquially known as configuration management tools. The term "configuration management" is ambiguous, and literal interpretations of frameworks such as ITIL and COBIT add further confusion. It's a poor choice of nomenclature, but it's a term that the industry has adopted. And although the world is rapidly moving to containers and serverless technologies, the underpinnings of these systems still require configuration management. Here are a few noteworthy points regarding these tools and the larger configuration and asset management space they belong to:

- **Different domains shape this space.** Think of the overarching space as three separate but interweaving domains: service, software, and element (see Figure 1). The "service" domain is platform-independent and integrative, and it overlaps with enterprise architecture at the upper end. The "software" domain consists of design, build, and deployment technologies. It's more platform-aware and can span multiple platforms, such as on-premises and cloud. The "element" domain is where operations typically occur. It's platform-bound, can be imperative- or declarative-focused, and is often supplied by a vendor or third party.[3] The element domain is where the provisioning and control subdomains live (see Figure 2). Within these subdomains are the tools to discover, provision, and control configuration elements.[4] These latter subdomains form the basis for this Forrester Wave.[5]
- **Configuration management is structured and deterministic.** Every type of automation has a characteristic visual profile that we define along nine key dimensions of Forrester/s automation framework.[6] Configuration management's profile is relatively mechanical, requiring coded, structured data processed with a high degree of determinism. From an enterprise perspective, the technology requires a relatively low robotics quotient (RQ) to operate and is transparent to audit.[7] Most of the action is on the back end; the social impact is narrow; and the role of the worker stays relatively focused on the individual.
- **Automation escalates configuration management from concept to reality.** This Forrester Wave focuses on a particular set of automated tools that apply configuration policies to applications, systems, and cloud resources or apply them directly to hardware. These policies must be model-based and human-readable (see Figure 3). They must also be scalable and reusable across environments, avoiding the "snowflake" (i.e., unique) configurations typical among traditional

infrastructure management. The tools must identify drift as quickly as possible and remediate it; this reduces the chance of human-enabled mistakes and lowers risk.[8] There should be an audit trail for all changes, and users should be able to review reports and correct compliance issues.

- **Element configuration management tools will eventually converge with CDRA.** Continuous delivery release automation (CDRA) tools model, package, and deploy apps. Advanced CDRA products have the choreography to manage releases across complex, clustered environments, addressing issues like draining queues and quiescing workloads prior to applying new software packages. CDRA is a critical component of software-powered businesses and a central capability of DevOps.[9] Increasingly, organizations are using configuration management to normalize environments and ensure consistency. Some application release automation platforms leverage the configuration management tools we evaluate in this Forrester Wave, while others attempt to perform configuration management tasks on their own. Regardless, these two worlds are colliding, and we expect to see further consolidation in the coming years.
- **I&O pros must evolve or retire — because administrators are now developers.** Forrester believes that I&O professionals increasingly need to draw on design thinking and application best practices to maintain their value.[10] This means becoming developers: treating systems as blocks of code, checking this code into repositories, and following well-established continuous development and integration practices.[11] As infrastructure becomes increasingly composable, I&O will design and codify reference infrastructure compositions alongside enterprise architects. Target, for example, recently stated that its I&O team (rebranded Guest Reliability Engineering) hires only engineers who can code.[12]

FIGURE 1 Different Processes And Tools Live Within Three Domains Of Asset And Configuration Management

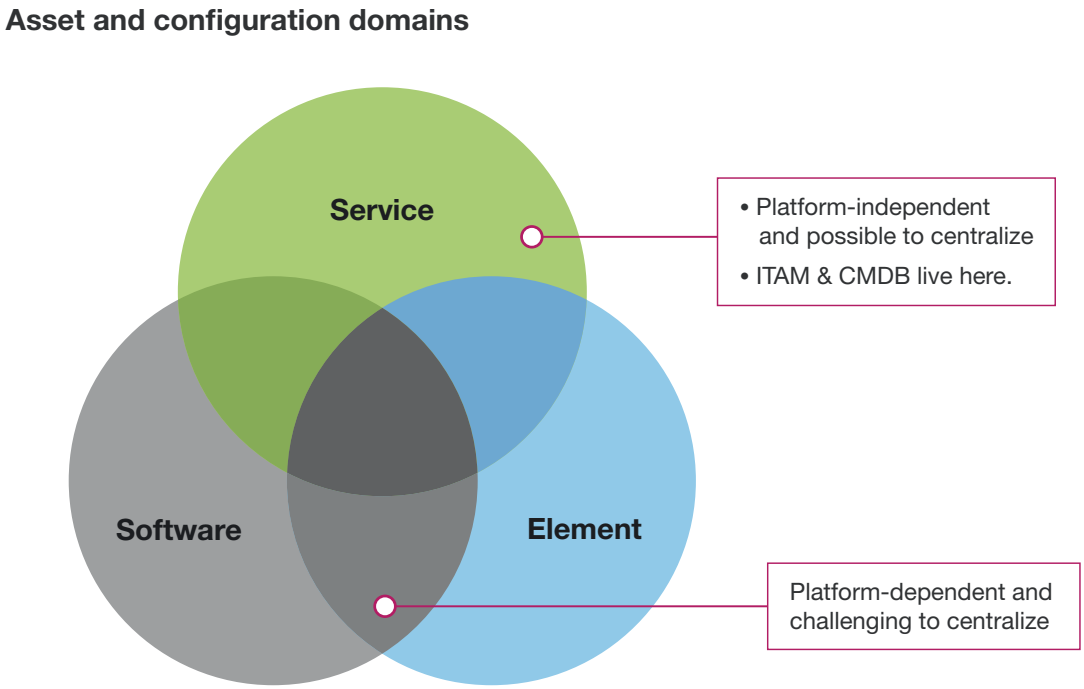


FIGURE 2 Service, Software, And Element Embody Specific Use Cases

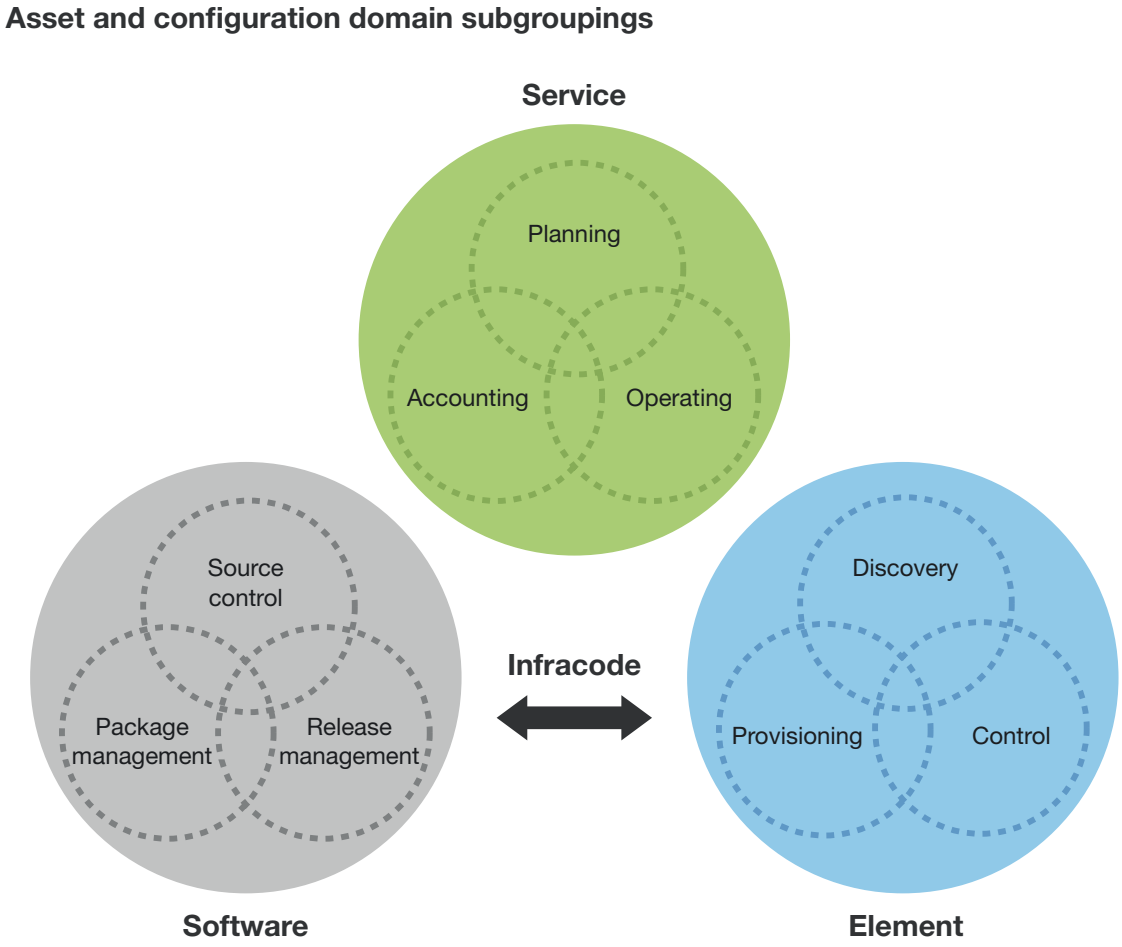
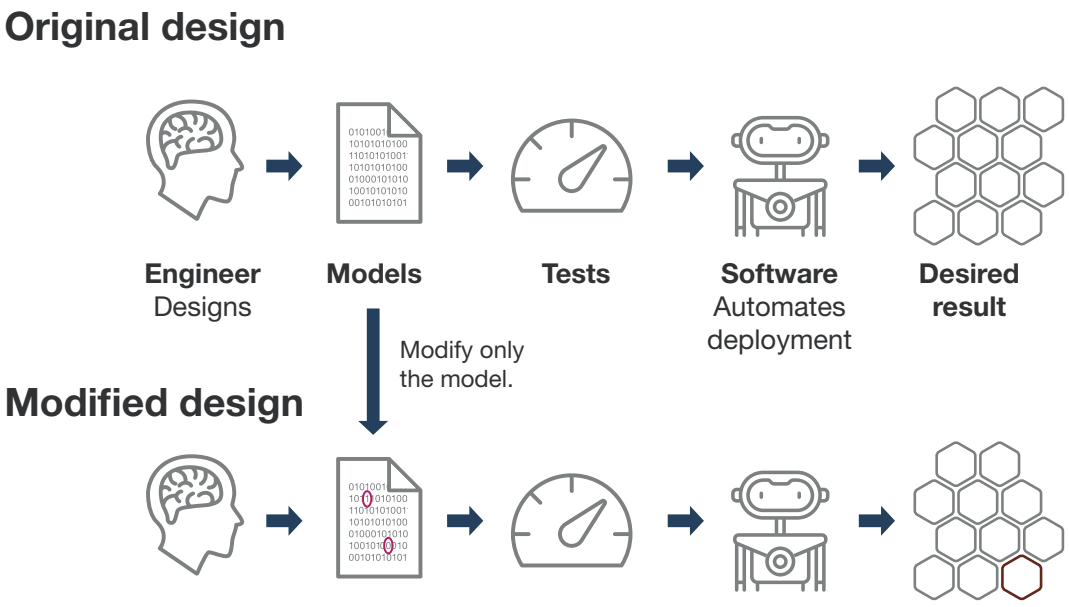


FIGURE 3 Configuration Management Uses Models To Build Infrastructure-As-Code



Configuration Management Evaluation Overview

To assess the state of the configuration management market and compare how the solutions stack up against each other, Forrester evaluated the strengths and weaknesses of top configuration management vendors' tools. After examining past research, user needs assessments, and vendor and expert interviews, we developed a comprehensive set of evaluation criteria. We evaluated the solutions against 27 criteria, which we grouped into three high-level categories:

- **A current offering that delivers a minimum set of capabilities.** Evaluated solutions had to provide a minimum set of capabilities, including deployment, configuration modeling, automation, monitoring and governance, and community support.
- **A strategy that leads to better offerings in the future.** To assess strategy, we analyzed product strategy, market approach, consulting, training and support, and innovation in pricing.
- **A market presence that demonstrates vendor stability.** To score market presence, we analyzed installed base and corporate profitability.

Evaluated Solutions And Inclusion Criteria

Forrester included seven vendors in this assessment: Canonical, Chef, Microsoft, Northern.tech, Puppet, Red Hat, and SaltStack. Each of these vendors (see Figure 4):

- **Meets eligibility requirements.** The products we evaluated were generally available on or before July 1, 2018.
- **Has established itself as a configuration management vendor.** Each vendor has established itself as a key configuration management vendor, in accordance with a Forrester review of core features.
- **Supplied publicly available documentation.** Each vendor supplied links to product feature documentation. This information is available regardless of business relationship.
- **Has drawn established client interest.** Each vendor has sparked interest (in the form of regular, unprompted mentions and inquiries) from Forrester's client base over the past 12 months.
- **Delivers a minimum set of configuration management capabilities.** Each vendor demonstrated its solution's ability to support configuration management, such as deployment, configuration modeling, monitoring and governance, and community support.

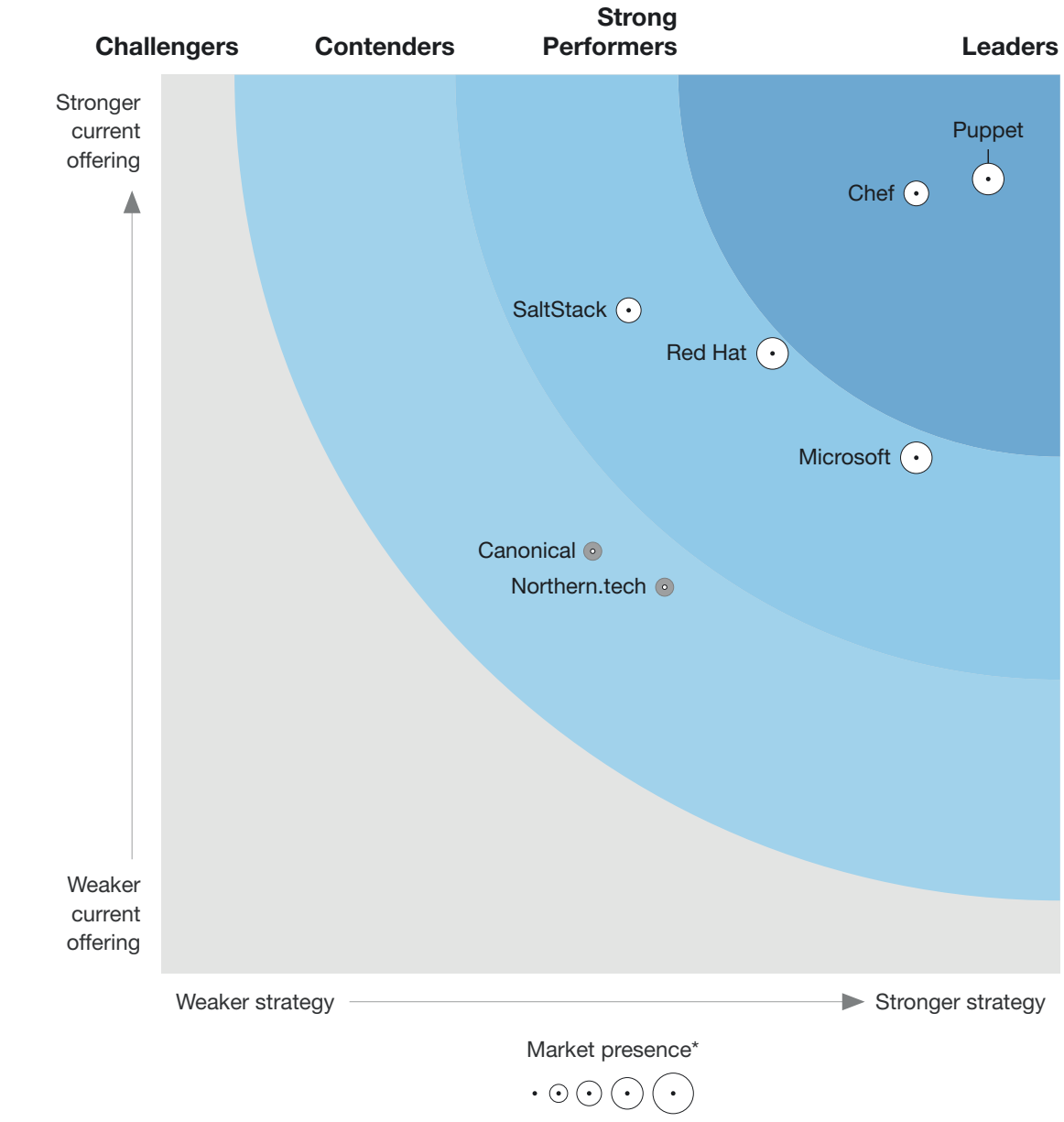
FIGURE 4 Evaluated Vendors And Product Information

Vendor	Product evaluated
Canonical	Juju
Chef	Chef Automate
Microsoft	Azure Automation and PowerShell DSC
Northern.tech	CFEngine Enterprise
Puppet	Puppet Enterprise
Red Hat	Ansible Tower
SaltStack	SaltStack Enterprise

Vendor Profiles

We intend this evaluation of the configuration management market to be a starting point only and encourage clients to view detailed product evaluations and adapt criteria weightings to fit their individual needs through the Forrester Wave Excel-based vendor comparison tool (see Figure 5 and see Figure 6). Click the link at the beginning of this report on Forrester.com to download the tool.

FIGURE 5 Forrester Wave™: Configuration Management Software For Infrastructure Automation, Q4 2018



*A gray marker indicates incomplete vendor participation.

FIGURE 6 Forrester Wave™: Configuration Management Software For Infrastructure Automation Scorecard, Q4 2018

	Forrester's weighting	Canonical*	Chef	Microsoft	Northern.tech*	Puppet	Red Hat	SaltStack
Current offering	50%	2.35	4.34	2.87	2.15	4.42	3.45	3.69
Deployment	30%	3.50	5.00	1.50	3.50	5.00	3.50	3.50
Configuration modeling	20%	2.60	3.60	4.00	2.60	3.60	3.80	4.60
Automation	10%	1.00	2.00	3.00	1.00	2.00	3.00	3.00
Monitoring and governance	20%	1.40	4.60	3.60	2.40	5.00	3.20	3.60
Community support	20%	2.00	5.00	3.00	0.00	5.00	3.50	3.50
Strategy	50%	2.40	4.20	4.20	2.80	4.60	3.40	2.60
Product strategy	40%	2.00	3.00	5.00	3.00	4.00	3.00	2.00
Market approach	10%	1.00	5.00	5.00	3.00	5.00	5.00	3.00
Consulting, training, and support	10%	3.00	5.00	5.00	1.00	5.00	5.00	3.00
Innovation in pricing	40%	3.00	5.00	3.00	3.00	5.00	3.00	3.00
Market presence	0%	1.60	2.70	3.60	1.80	3.20	3.50	2.20
Installed base	50%	1.00	3.00	5.00	2.00	4.00	4.00	2.00
Corporate profitability	50%	2.20	2.40	2.20	1.60	2.40	3.00	2.40

All scores are based on a scale of 0 (weak) to 5 (strong).
*Indicates a nonparticipating vendor.

Leaders

› **Puppet is strong on reliability as well as monitoring and governance.** Puppet Enterprise augments the open source Puppet offering with a web-based UI that provides visibility into configurations, dependencies, and events. Role-based permissions let compliance professionals easily access reports and event trails, while enhanced APIs provide orchestration capabilities and integration with common enterprise systems. Puppet Enterprise's strengths include its deployment options, monitoring and governance, and community support. Customers cited their relationships with Puppet as well as the flexibility and reliability of the tool as strengths; they expressed concerns about ramping up staff skill sets to use the tool and about the cost.

› **Chef excels at community support and integration with service management.** Chef Automate builds on the Chef open source automation engine, integrating the respective projects of Habitat and InSpec, and provides a web-based GUI and dashboard for compliance visibility. A code repository — the Chef Supermarket — hosts thousands of Cookbooks (Chef code) that allow users to download and reuse common configurations. Automate excels at deployment support, monitoring and governance, and community support. Customers touted Chef's wide compatibility, secret management, and integration with service management tools as strengths; they called out challenges with pipeline automation and bootstrapping new nodes.

Strong Performers

› **Microsoft's model creation and preventative controls stand out.** Microsoft Azure Automation is a software-as-a-service (SaaS)-based suite for process automation, configuration management, change tracking, inventory, and update management. PowerShell DSC is a free offering that configures desired state on a variety of operating systems. Azure Automation integrates with Azure Security Center and Azure Policy to provide extensive compliance capabilities. Azure Automation's strengths include model creation, monitoring and governance, and support for third-party plug-ins. Customers called out preventative controls, Linux support, and the ability to integrate with other tools as strengths; they cited policy limits and role-based access controls for playbooks as weaknesses.

› **Red Hat's strengths include system support and third-party integration.** Ansible is part of Red Hat, and Ansible Tower integrates with other products in the Red Hat suite, including CloudForms (centralized governance and orchestration), Insights (machine learning), and Satellite (monitoring patch levels). Role-based access control permits individuals to access tasks with their security passed onto processes. Ansible Automation's strengths include system support, community engagement, and integration with out-of-the-box third-party plug-ins. Customers listed Red Hat Ansible's role-based access controls and workflow tools as pluses; they felt that the vendor could improve its cloud support.

› **SaltStack offers strong analytics, reporting and defect tracking.** SaltStack Enterprise builds on the open source Salt offering, providing an enterprise GUI and API for integration. Operations teams primarily use SaltStack Enterprise, but users can be assigned reports on failures for troubleshooting and remediation. Role-based security permits compliance professionals to log in and run reports based on CIS, CVE, and STIGS entries.[13] SaltStack Enterprise excels at configuration modeling, analytics and reporting, and vulnerability/defect tracking. Customers liked SaltStack Enterprise's Beacon and Reactor capabilities, remote execution, and speed; they cited weaknesses that include integration challenges and the user interface.

Contenders

› **Northern.tech excels at system support and drift correction.** The Enterprise version of Northern.tech's CFEngine adds professional services and support to CFEngine Community Edition. It provides a GUI/dashboard to administer and monitor node health, user-based and role-based management, richer reporting, and modules to better support operating systems such as AIX and Windows. CFEngine Enterprise excels at system support and drift correction. Northern.tech declined to participate in our research; scores are based on Forrester estimates.

› **Canonical's model creation and community engagement are pluses.** Canonical Juju provides configuration management capabilities alongside application modelling. Users can write Charms (Juju code) in any programming language and can automate cloud resources along with bare metal. Users can also create and edit models visually. Juju's strengths include system support, model creation, and community engagement. Canonical declined to participate in our research; scores are based on Forrester estimates.

Supplemental Material

Online Resource

The online version of Figure 5 is an Excel-based vendor and solution comparison tool that provides detailed product evaluations and customizable rankings. Click the link at the beginning of this report on Forrester.com to download the tool.

Data Sources Used In This Forrester Wave

Forrester used a combination of three data sources to assess the strengths and weaknesses of each solution. We evaluated the solutions of the vendors participating in this Forrester Wave, in part, using materials provided to Forrester on or before July 1, 2018.

- **Vendor surveys.** Forrester surveyed vendors on their capabilities as they relate to the evaluation criteria. Once we analyzed the completed vendor surveys, we conducted vendor calls where necessary to gather details of vendor qualifications.
- **Customer reference calls.** To validate product and vendor qualifications, Forrester also conducted reference calls with three of each vendor's current customers.
- **Vendor demonstrations.** Vendors demonstrated their technologies against a common set of use cases identified by Forrester from client inquiries.

The Forrester Wave Methodology

We conduct primary research to develop a list of vendors that meet our criteria for evaluation in this market. From that initial pool of vendors, we narrow our final list. We choose these vendors based on 1) product fit; 2) customer success; and 3) Forrester client demand. We eliminate vendors that have limited customer references and products that don't fit the scope of our evaluation. Vendors marked as incomplete participants met our defined inclusion criteria but declined to participate or contributed only partially to the evaluation.

After examining past research, user need assessments, and vendor and expert interviews, we develop the initial evaluation criteria. To evaluate the vendors and their products against our set of criteria, we gather details of product qualifications through a combination of lab evaluations, questionnaires, demos, and/or discussions with client references. We send evaluations to the vendors for their review, and we adjust the evaluations to provide the most accurate view of vendor offerings and strategies.

We set default weightings to reflect our analysis of the needs of large user companies — and/or other scenarios as outlined in the Forrester Wave evaluation — and then score the vendors based on a clearly defined scale. We intend these default weightings to serve only as a starting point and encourage readers to adapt the weightings to fit their individual needs through the Excel-based tool. The final scores generate the graphical depiction of the market based on current offering, strategy, and

market presence. Forrester intends to update vendor evaluations regularly as product capabilities and vendor strategies evolve. Vendors marked as incomplete participants met our defined inclusion criteria but declined to participate in or contributed only partially to the evaluation. For more information on the methodology that every Forrester Wave follows, please visit The Forrester Wave™ Methodology Guide on our website.

Integrity Policy

We conduct all our research, including Forrester Wave evaluations, in accordance with the Integrity Policy posted on our website.

Endnotes

[1] For the current infrastructure-as-code landscape, see the Forrester report "Become A Unicorn With Infrastructure-As-Code."

[2] For more information on the strategic advantage of DevOps, see the Forrester report "DevOps: The CIO's Guide To Velocity."

[3] Imperative approaches look like typical code: Do X, then Y, then Z. In a declarative approach, you define the end state and the automation engine gets you there, e.g., "create an account" — and the engine figures out how best to create the account given the system you're targeting.

[4] For an in-depth review of these domains and subdomains, see the Forrester report "Refine Configuration Management And CMDB For The Modern Digital Organization."

[5] There's an additional class of discovery tools (e.g., Firescope and IBM TADDM), associated with hardware and software asset management and IT service management, that is out of scope for this evaluation.

[6] For more on the nine dimensions and their impact, see the Forrester report "Digital Transformation Demands A New Automation Framework."

[7] RQ is a measure of your readiness for automation, artificial intelligence (AI) and robotics. To evaluate your proficiency, see the Forrester report "RQ: Assess Your Readiness For Working Side By Side With Robots And AI."

[8] To understand the criticality of automation in regard to security and compliance, see the Forrester report "Reduce Risk And Improve Security Through Infrastructure Automation."

[9] For an overview of the players in this space, see the Forrester report "Now Tech: Continuous Delivery And Release Automation, Q3 2018."

[10] To understand the role of design thinking in the modern I&O organization, see the Forrester report "Reshape Your Application Support For Digital Operations."

[11] For a detailed dive into the skill sets needed by sysadmins in the future, see the Forrester report "Evolve Or Retire: Administrators Are Now Developers."

[12] Source: Thierry Fernaine and Troy Collings, "Session 107: How Target Reimagined Service Management (Case Study)," Service Management World, October 16, 2018 (https://www.smworld.com/conference/Session?session=Session-107-How-Target-Reimagined-Service-Management-2018-10-16).

[13] CIS, CVE, and STIGS are security management frameworks. Source: Center for Internet Security (https://www.cisecurity.org/), Common Vulnerabilities and Exposures (https://cve.mitre.org/), and Security Technical Implementation Guides (STIGs) (https://iase.disa.mil/stigs/Pages/index.aspx).

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