

# Trends and Leaders in Platform Engineering and IaC

November 2024



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## Key Findings of This Report

- **Platform engineering is a growing movement to build a management layer that can unify automation of app deployment with infrastructure, bringing better efficiency, compliance, and security to an organization's IT assets.** Our research across several vectors of vendor and user feedback indicates this market is growing in importance.
- **Infrastructure as Code (IaC) is a set of automation and orchestration tools that are crucial to platform engineering.** IaC can be linked with DevOps platforms such as internal developer platforms (IDPs) as well as platform engineering to deliver better automation of infrastructure in cloud environments.
- **Introducing platform engineering and IaC can deliver real benefits in productivity.** Recent survey data from a DORA report as well as Puppet indicate users see productivity gains with a platform approach.
- **Demand for data fueling AI apps is increasing the need for full platform visibility.** The arrival of Gen AI and other flavors of enterprise AI will increase demand for cloud automation and platform engineering.
- **Futuriom research shows that multicloud and hybrid cloud architectures are gaining favor, which should drive further need for platform engineering and IaC approaches.** Of 131 pros surveyed, 70% said they have plans for hybrid deployments.
- **Cloud infrastructure spending is shifting toward the need to drive hybrid cloud automation.** Our recent survey of CxOs indicates that most companies are looking to accelerate cloud infrastructure, but cloud infrastructure is getting more complex and practitioners need visibility across a wide variety of infrastructure domains.
- **End users are likely to see multicloud and network connectivity as part of platform engineering and IaC needs.** In our recent survey, a majority of respondents in networking and IT roles (95%) said there is a "critical" or "very important" need for multicloud connectivity.
- **Companies mentioned in this report:** Amazon, Atlassian, Aviatrix, Cortex, Google, HashiCorp, Humanitec, Microsoft, Pulumi, Spacelift, System Initiative, VMware (Tanzu)



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# 1. Introduction: Why the World Needs IaC and Platform Engineering

It's a first! After publishing a successful series of reports on multicloud infrastructure, AI infrastructure, SASE, cloud security, and cloud AIOps, Futuriom has launched our first report on platform engineering and infrastructure as code (IaC). Our expectation is that this will follow in the footsteps of our successful cloud security, SASE, and multicloud reports, which have been growing over multiple years of gathering information on the direction of markets.

Futuriom's research with end users shows they need better tools to manage the growing complexity of IT environments—including both cloud-native and traditional enterprise, as well as public and private cloud. They are also struggling to integrate environments to provide their staff with effective automation tools to manage development and infrastructure and improve management goals such as observability and compliance.

This report will focus on how the technologies that comprise platform engineering, IaC, and IDPs are being integrated to provide a more robust management and orchestration system for hybrid environments. After spending months talking to end users, investigating public research, and getting briefed about the platform engineering environment, it's clear that the trend is gathering momentum, but it's still early days and it will require more work before these markets accelerate.

The value of both platform engineering and IaC is already clear in the market. We view platform engineering as another level of abstraction of cloud management that can help cloud architects securely manage applications and infrastructure across diverse environments. Some of the problems these technologies can solve include:

- Enabling better organizational collaboration and visibility of technology apps and infrastructure.
- Acceleration of product and service delivery.
- Improved organizational system controls, such as compliance and security.

In this report we'll dive into some definitions of platform engineering, IaC, and products such as IDPs, which are all part of the platform engineering movement. We'll talk about the changing technical landscape, the challenges that users are having managing their applications and infrastructure, and finally, some of the potential solutions and leaders we have studied so far.

## About Our Methodology

Futuriom is focused on what's happening with technology in the real world. We spend many hours talking to technology users, vendors, and researching deployments. When we can, we consult user data rather than marketing documents. Where possible, we cite sources.

The basis of our research is our weekly, primary conversations with end users as well as observations of what technical leaders are doing in the community. Additional sources are public survey data, both our own as well as data from other reputable sources. Some crucial information for this report came from Google Cloud's DORA report as well as survey data published in The New Stack.

As always, we also spend a lot of time with startups, investigating the companies we feel currently are special to watch. As in all of our reports, there is no "pay to play" operation behind this report. We do have sponsors, but we include any company or technology that is relevant to the market. Our goal is to present an independent view of the market, and sponsors sign up for post-publication benefits such as a report license and data about downloads.

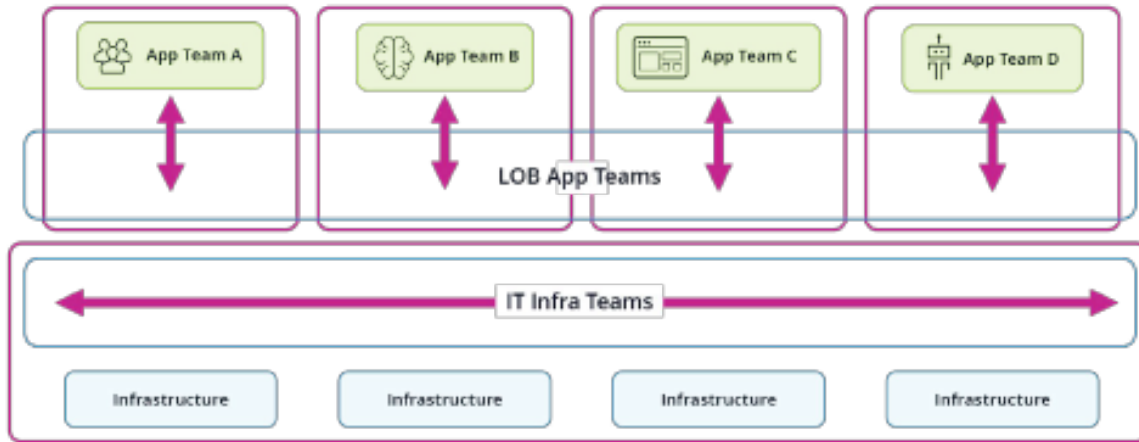
## Defining Platform Engineering and IaC Technologies

As with many of our reports, we'll start with the taxonomy and definitions used in this report, to provide context.

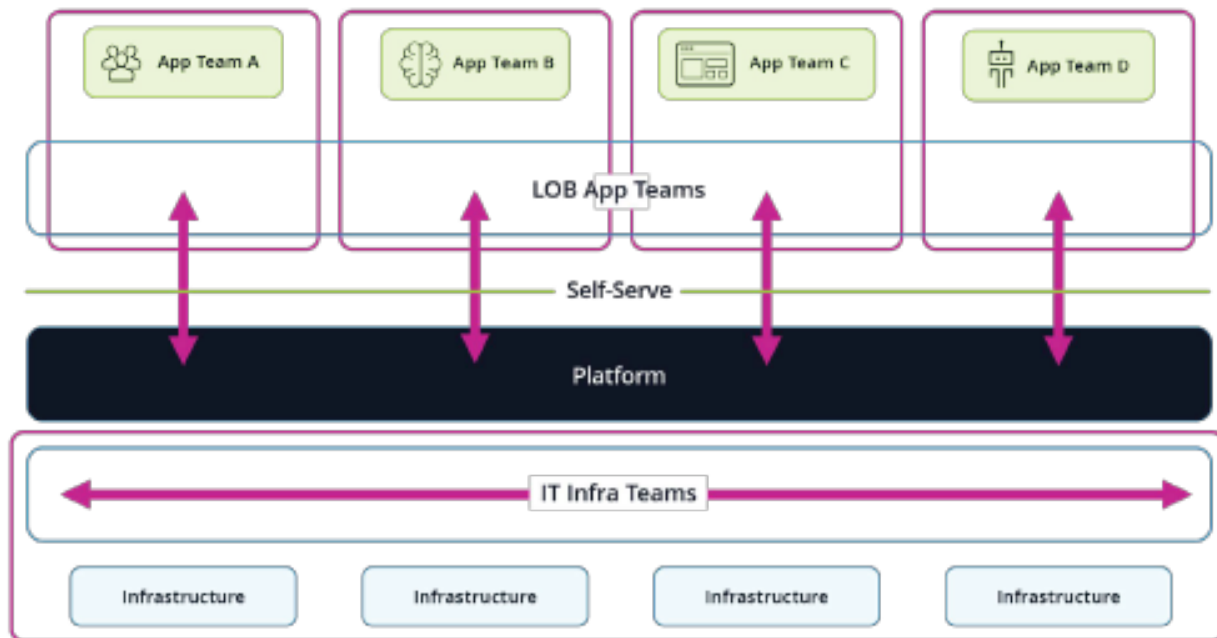
What is platform engineering exactly? It's complicated. Platform engineering is a high-level software approach seen as a solution to managing complex, heterogeneous environments and driving better integration and automation of apps across infrastructure. At its highest level, think of platform engineering as an abstraction that can help orchestrate infrastructure as well as standardize business processes and automation.

Platform engineering also means helping IT and DevOps teams build a standardized set of products and services that can be consumed in an organization in a self-service model. If the platform contains a standard set of tools, services, and a place to manage them, it not only speeds up adoption by teams, but it provides centralized compliance and security as well.

Currently, many organizations have a large gap between development and infrastructure teams, and platform engineering can be used to close this gap with better automation of apps with IT infrastructure, as the diagram below shows.



In the diagram above, app teams operate using a wide array of software and CI/CD tools to deliver code and applications. But these app teams aren't always connected with infrastructure teams, who need to know what type of infrastructure will be needed to deliver the apps. Instead, what you need is this:



Source: Itential

Kelsey Hightower, a well-known cloud architect and Google Distinguished Engineer, says that the platform engineering topic is very broad, but it has a common theme: It's about enabling the organization's technical infrastructure. He had this to say in a [talk at PlatformCon 2024](#):

*“All the things you are doing to do from a raw Linux install until it’s usable for the organization, that whole thing is platform engineering. You can take this to cloud, you can take this to databases ... it’s not surprising to me that the majority of people doing this kind of work are rallying around one way of doing that stuff—platform engineering—cause it’s such a broad topic. It literally is the foundation for all the other stuff that we do. ”*

- Kelsey Hightower

Let’s look at how we are defining platform and its elements:

**Platform engineering** aims to build development and infrastructure platforms that provide a standardized set of tools and technology to enable collaboration, integration, and cooperation among a diverse set of technical teams. By providing a platform, the organization aims to improve the quality, compliance, and efficiency of applications and service delivery across a common infrastructure. Platform engineering can act as an abstraction management layer for subsets of the technology, which might include internal developer platforms (IDPs), DevOps tools, and infrastructure as Code (IaC).

**IDPs** are suites of tools and services used by DevOps teams to help a team build, manage, and deploy software. IDPs vary in functionality, but some tasks include managing code deployments, configurations, and DevOps pipelines. As a part of platform engineering, IDPs can be integrated with IaC and other functions to build a more extensive platform connected to infrastructure and management functions.

**IaC** uses tools to automate the configuration and orchestration of infrastructure, built into the applications themselves as integrations (through APIs) or as code itself. IaC can have use cases that cross technology segments. For example, it can be used in software development to build, test, and deploy applications. It can also be used to configure and deploy diverse infrastructure resources, including compute, networking, and storage.

There is, of course, crossover among these technologies. They all target the same goal: better integration of development and infrastructure workflows.

Evan Bottcher, a well-known technical leader who is currently Chief Architect of REA, puts it this way:

*“A digital platform is a foundation of self-service APIs, tools, services, knowledge and support which are arranged as a compelling internal product. Autonomous delivery teams can make use of the platform to deliver product features at a higher pace, with reduced coordination.”*

(Source: martinowler.com)

Futuriom sees the platform engineering category as an evolution of earlier configuration and management tools. Early scripting and automation tools such as Puppet and Chef helped set the stage for IaC by enabling teams to automate repetitive tasks. Then came Terraform, a previously open-source tool produced by HashiCorp that became popular with engineers seeking to embed cloud infrastructure instructions into applications. On the back of Terraform as well as Hashi's security product, Vault, HashiCorp grew fast and went public in 2021.

But true platform engineering will move well beyond these tactical tools to provide a more comprehensive automation that can link islands of automation together. It's useful to look at platform engineering as a category that can drive integration across the automation ecosystem (configuration management, IDPs, and IAC) to build a more cohesive management platform.

“The whole infrastructure as code market is not any one tool right now, there are many of them,” Matthew Sanabria, a System Reliability Engineer with Cockroach Labs who is a user of Hashi, Pulumi, and System Initiative, recently told us.

So, let's dig into some more information on what's happening in platform engineering in IaC!

## 2. Demand Drivers: Key Platform Challenges for Infrastructure and DevOps

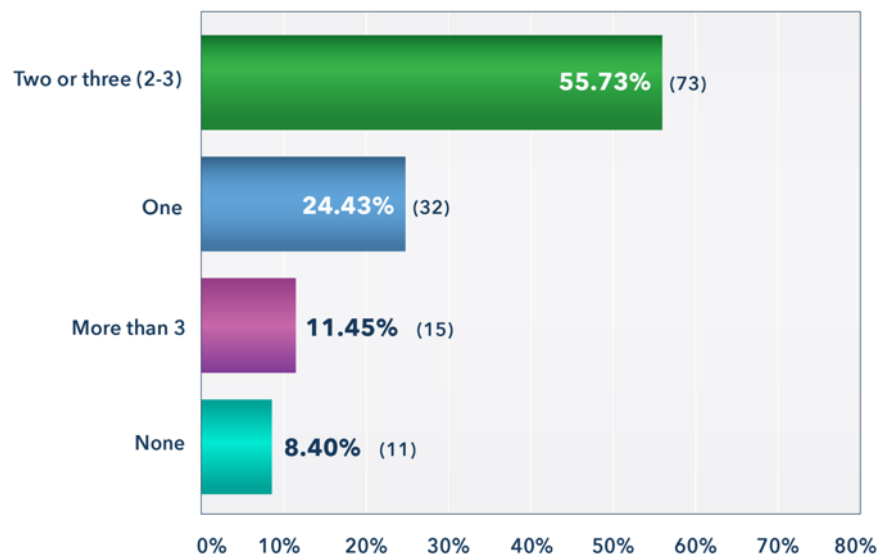
Technology markets are filled with jargon and labels. Some of these concepts turn into huge market trends, and others are just marketing toys. In this report we'll drill down into some of the jargon and acronyms, but first let's start with the challenges and problems in the cloud platform world.

The key to success in any technology market is product-market fit. Are the products hitting the market solving the key customer needs in a productive way? More importantly, can they improve process, workflow, and efficiency and deliver a clear business ROI?

### Infrastructure Is More Complex Than Ever

As we wrote in our recent multicloud networking report in October, cloud infrastructure is more complex than ever. In our survey of 131 IT professionals, the majority of end users (56%) were using two or three clouds, and 11% were using more than three. That means 67% are in a multicloud or hybrid cloud world.

**How many public cloud infrastructure services (Platform as a Service or Infrastructure as a Service) are you currently using?**



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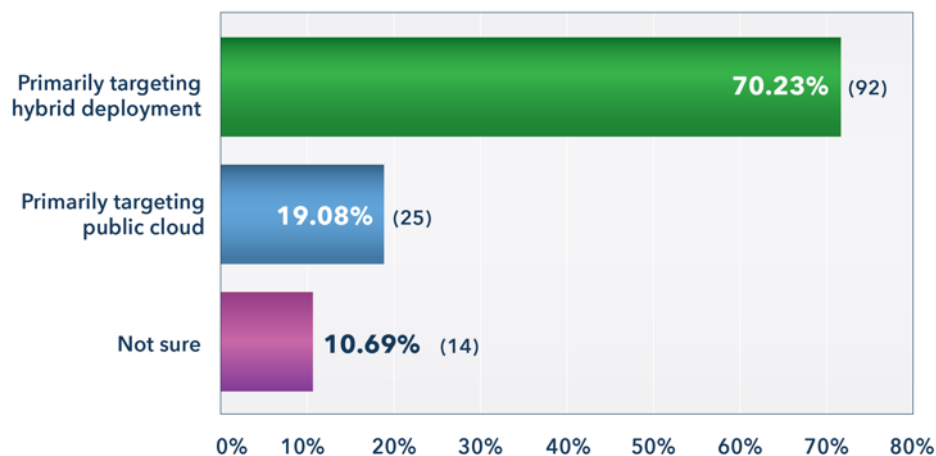
N = 131

As multicloud and hybrid cloud architecture grow, this means that services are more distributed than ever in a diverse ecosystem. The networks must connect a wide range of cloud providers, content delivery networks (CDNs), service providers, and enterprises. These connections must increasingly be made on-demand, using automated connectivity technologies.

Diving down deeper, our recent survey also showed increased adoption of hybrid infrastructure. Futuriom believes that AI will accelerate hybrid deployments because so much of the data needed for enterprise AI applications sits inside on-premises resources.

In our recent multicloud survey, when we asked 131 professionals whether they had plans for hybrid deployments, 70% said yes.

**Does your enterprise have plans for a hybrid deployment (continued investments in on-prem datacenter combined with cloud), or are you planning to migrate most on-prem workloads to the public cloud?**



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N = 131

## Broadening the DevOps Movement

Another key element of platform engineering and IaC is as a broadening of the DevOps movement. One of the DevOps movement's goals was to break down silos and enable better collaboration of teams around apps.

DevOps has been successful, but some industry experts say the movement should expand to tie together other elements of the technical infrastructure, including infrastructure and compliance.

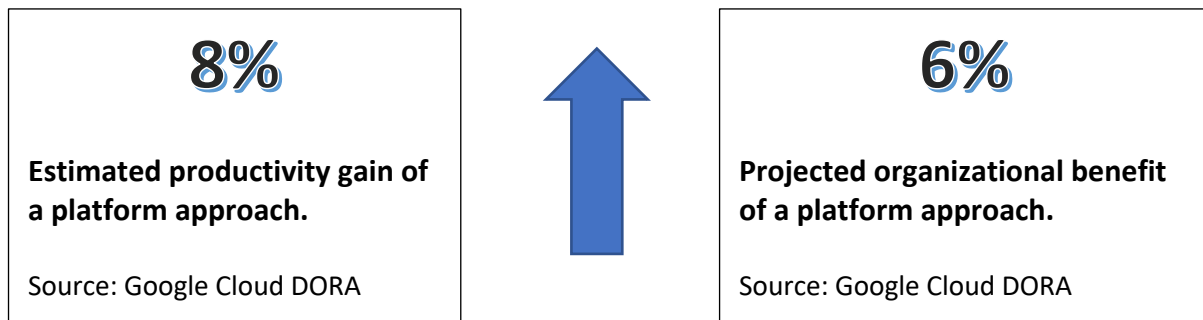
DevOps, after all, is still largely about DevOps and less about building infrastructure, let alone setting business goals. Platform engineering and IaC can help DevOps tools take that extra step—from building code to connecting it to the rest of the organization that needs to build infrastructure to support that code.

Steven Vaughan-Nichols recently [wrote in The New Stack](#) that DevOps may not be delivering. In an article called "DevOps Isn't Dead, but It's Not in Great Health Either," Vaughn-Nichols points to recent research that says that only 14% of companies can get software into production in a day and only 9% can deploy multiple times per day.

If DevOps teams are frustrated with efficiency, there is evidence that the market sees platform engineering and IaC as giving it a potential boost. Google Cloud's DORA report, "Accelerate State of DevOps 2024," gives platform engineering a boost. The survey of thousands of cloud professionals paints a generally positive perspective of the movement, pointing to its potential in improving productivity and organizational performance.

According to the DORA research, 89% of the survey respondents said they were using an IDP. Respondents reported to be 8% more productive, on average, with a platform. DORA estimates the organizational benefit of a platform at 6%.

"Platform engineering has a positive impact on productivity and organizational performance, but there are some cautionary signals for software delivery performance," concludes the report.



In summary, platform engineering and IaC tools are increasingly positioned as a way to expand the role and quality of DevOps.

## Breaking Down Silo Thinking

The first challenge that platform engineering aims to solve is silos. Silos are tribes or departments that develop in your business that can become disconnected from everybody else. Think of it as the cybersecurity department, or marketing, or the networking folks.

Technologists like to think of themselves as specialists (“I am a network engineer,” or “I am a DevOps engineer”), but that’s not how the world, or even the C-suite, thinks of technology. Technology is just a means to an end: It’s something to put in place to deploy a better service, product, or automation.

One of the key drivers of the need for platform engineering is the capability to break down business and technology silos. Building platform engineering or IaC into an organization’s technology toolset can help integrate departments and break down silos.

### **Providing Governance and Control**

One of the guiding principles of platform engineering is that it can help provide a single source of truth for an organization’s infrastructure and application development activities.

As we pointed out from Google Cloud’s DORA report, platform engineering is seen as having a positive impact on productivity and organizational performance, but there are also some potential pitfalls. Looking at more feedback from that report, another conclusion is that “Unstable organizational priorities lead to meaningful decreases in productivity and substantial increases in burnout, even when organizations have strong leaders, good internal documents, and a user-centric approach to software development.”

It does make sense that platform engineering can help avoid “unstableness,” which is something we would all like to avoid.

This research cited in Google’s DORA report show potential productivity gains in unifying tools under one platform. This also syncs with other published survey results in the market. According to a survey by Puppet and Perforce, the top benefits of platform engineering for developers includes increased productivity (50%), better quality of software (40%), better lead times (36%), and more stable applications (36%).

By designating a central place for deploying and configuring infrastructure and apps, platform engineering and IaC can reduce random configuration changes, shadow-IT type operations, and security risks.

### 3. Platform Engineering Ecosystem and Recent Developments

Now that we have a clearer picture of the key drivers of platform engineering in the engineering community, let's dive into what's happening in the vendor community.

As in many things cloud, the technology ecosystem is evolving as a complex cooperation among technical leaders using open-source tools, public cloud tooling, and commercial software products. This has been a pattern throughout the evolution of the cloud, if you look at the developments of influential technical products such as Linux, Puppet, Chef, Red Hat (Linux, VMs, and Open Shift), Kubernetes, and the new generations of IaC and orchestration tools such as **HashiCorp's Terraform**, **Spacelift**, **Pulumi**, and **OpenTofu**.

But platform engineering is bigger than all of these tools. It's about bringing them together and managing them from one place—the platform. In addition, it's about providing a place in the organization where engineers can access them in a self-service consumption model.

#### The Changing IaC and Open-Source Landscape

Let's start with looking at the recent developments and shifts in the IaC market, particularly with respect to established players and popular open-source projects, which always provide the foundation of technical development in cloud-native infrastructure.

The IaC market itself has been demonstrative of the tension between open-source and commercial interests. **HashiCorp** in 2003 fired the “shot heard round the open-source world.” Hashi has a suite of infrastructure products including Vault and Consul, but **Terraform** is one of its most well-known products and is among the most popular tools for IaC—a de facto industry standard. The industry was a bit shocked and divided when, in 2023, HashiCorp announced it was pulling its open-source licensing of Terraform and moving all of its licensing to commercial, business source licensing.

This move was met with some interesting developments. The original open-source code Terraform was forked by another group creating a project known as **OpenTofu**, designed to focus on the original goals of Terraform while at the same time keeping the new project open source. Companies such as **env0**, **Scalr**, and **Spacelift** have embraced **OpenTofu** as part of their software platforms.

Meanwhile, **Pulumi**, which should be regarded as one of HashiCorp's top commercial rivals, has emphasized its commitment to an open-source strategy and advocates a more open approach to IaC, including the incorporation of diverse code bases and languages (HashiCorp is heavily dependent on its own language, HCL). In addition, Seattle-based Pulumi is also becoming more competitive with Hashi. In September, it announced two new products, Pulumi ESC and Pulumi Insights, designed to automate, secure, and manage cloud infrastructure. Pulumi is intent on building a large and powerful platform to go right at HashiCorp and take advantage of its competitor's tumultuous past couple of years. At the recent Kubecon in Salt Lake City, Pulumi also introduced a Kubernetes deployment agent, giving it a foothold in the growing Kubernetes management space.

**Spacelift**, another important company to watch in IaC and platform engineering, is taking an interesting approach by providing support for both cloud native and hybrid architectures with coverage for of a wide range of configuration and IaC tools such as Terraform, OpenTofu, CloudFormation, Pulumi and Ansible. In addition to orchestrating provisioning and configuration management tools, Spacelift is also focused on the governance of pipelines. The goal is to provide a comprehensive platform engineering approach with a single integrated workflow. In November, Spacelift announced that the platform now automates the execution of Ansible playbooks, delivers inventory visibility and control over Ansible-managed resources, and links provisioning workflows (Terraform and OpenTofu, etc.) with configuration management (Ansible).

Newer upstarts such as **System Initiative** are looking to take advantage of the shifting landscape to promote a visual, intuitive approach to IaC. System Initiative's software-as-a-service platform, called System Initiative, allows engineers to design cloud infrastructure using a collaborative "multiplayer" approach. Like Pulumi and unlike HashiCorp, the company will also adhere to an open-source model with a free tier and usage-based pricing for premium. Cofounder and CEO Adam Jacob also cofounded Chef Software and was the author of the Chef automation tool.

## Kubernetes and the Rise of the Platform Control Plane

We recently attended Kubecon in Salt Lake City, which was bustling with excitement about the Kubernetes market. Kubernetes has become the de facto standard for managing cloud workloads across hybrid environments, which has led to development of platform tools that manage Kubernetes on hybrid infrastructure.

Kubernetes includes the concept of a platform control plane. Kubernetes control planes can be

used to program policies, permissions, and other security guardrails across apps and infrastructure, regardless of where they are hosted.

**Crossplane** is one of the open-source projects that has recently gained momentum by extending the Kubernetes control plane. Commercial venture-backed startup **Upbound** is the inventor and primary maintainer of Crossplane. Upbound's customers include Deutsche Kreditbank, Gameloft, Millennium bcp, Variphy, and others. The company claims more than 300% sales growth in the past year.

## Shifting Platform and IDP Vibes

What about IDPs? IDPs have close alignment with platform engineering and are expanding their roles for a platform approach.

Key DevOps platforms include **Atlassian**, **Microsoft**, **GitLab**, **Jfrog**, **VMware (Tanzu)**, and **Red Hat**. **Humanitec** has an IDP as well as platform engineering tools that include a platform orchestrator targeting complex deployments and configuration checks.

These platforms have some but not all the elements of platform engineering. DevOps and IDP generally target CI/CD and software delivery management but less so IaC and full platform engineering credentials.

**GitLab** recently went public, growing its brand and bank account, and it's focused on building traceability and compliance across software pipelines. It also has many security features. Microsoft provides GitHub and Azure DevOps for code and software management. **Atlassian** has a wide suite of software management products and targets a mind-boggling array of job roles, but its closest product targeted at platform engineering is Compass, a developer portal that it says "provides a real-time representation of the engineering output in one place." This includes apps and integrations.

Many of these environments are targeted at developers, however, and lack some of the IaC functionality one would expect in a full-fledged platform engineering application. However, given their wide adoption, we would expect these products and companies to have a significant role in the platform engineering evolution.

## Public Cloud Platform Efforts

The largest public cloud providers are aware of the platform engineering movement and are

making inroads in providing better tools to help engineers build full-fledged platforms. A key consideration, however, is how public cloud platforms will play with true platform engineering, which requires the capability to adopt multicloud and hybrid cloud architectures. To put it simply, the natural business incentive of a large public cloud provider is to keep end users locked into their own platform with less incentive to provide multicloud capabilities.

Earlier in 2024, **Amazon Web Services** made efforts here, announcing that its Service Catalog and AWS CloudFormation now support Git-sync capabilities to “allow Platform Engineers to streamline their DevOps processes by keeping their IaC templates in their source control libraries like GitHub and BitBucket.” Amazon says this will allow platform engineers to further integrate IaC code and Git functions.

**Microsoft** is in a powerful position to promote platform engineering as the owner of GitHub, one of the leading code management platforms, as well as Azure, one of the leading public cloud services. Microsoft recently called out platform engineering as part of its “Secure Future Initiative (SFI),” a strategy to build centralized cybersecurity and compliance features across its products and platforms. Microsoft says in marketing materials that platform engineering will be a critical tool in its cloud efforts.

**Google** publishes lots of information on platform engineering, and its DORA report targeting the developer markets is a leading source of insights, as referenced in this report. However, Google hasn’t crystallized a single platform engineering approach or product but rather talks about how its tools can be adopted as part of a platform engineering approach—including Google Kubernetes Engine, Cloud Run, Compute Engine, and its own IDP, just to name a few.

## Advances in IaC, Networking, and NetDevOps

Futuriom believes that to deliver true platform engineering, classic network orchestration must be included in the functionality with DevOps functions. This is a movement being called NetDevOps. Earlier in the year, Futuriom published our Cloud Automation with Observability, AIOps, and NetDevOps report, which outlined the complex array of technologies needed to deliver true cloud automation.

In that report, we pointed out that observability tools are increasingly overlapping with networking and dev tools to drive the automation of hybrid infrastructure. Practitioners are looking to enable NetDevOps with APIs, as well as tools such as IAC.

To provide a true platform approach, NetDevOps should be included in the conversation with

DevOps. To provide the infrastructure for this hyper-distributed infrastructure and data environment, the next-gen hybrid cloud infrastructure will require more automation than ever before. It's no longer possible to manually connect, monitor, and operate cloud infrastructure. The scale of data, connectivity, and storage is too vast. As organizations seek more flexible and affordable cloud platforms for managing data and applications in both on-premises and public cloud environments, the demand for cloud automation technologies is greater than ever before.

In the multicloud space, cloud networking specialists such as **Aviatrix** and **Prosimo** can serve as Terraform providers and help enable multicloud overlaps using an IaC approach. **Itential** recently announced its Automation Services, which help NetDevOps engineers standardize, execute, and securely share infrastructure automations across teams.

As you can see, the landscape of potential platform and IaC tools is vast, but we wouldn't consider something a true platform tool until it includes NetDevOps functionality.

## 4. Conclusion: What's Next for Platform Engineering and IaC?

Futurium believes that platform engineering is part of the overall trend of driving better integration and management to manage more complex cloud infrastructure environments. This challenge is only likely to get more compelling with the advent of AI applications.

True platform engineering, however, should not be limited to tools and systems geared exclusively for DevOps teams. Futurium's recent work in cloud cost management and NetDevOps indicates that management teams in networking and security divisions, for example, would like better coordination and automation of apps and infrastructure. Therefore, one key to platform engineering is to enable higher-level management platforms that can cross organizational boundaries to deliver broad operational efficiency, security, and automation.

One of the themes that stuck out for us at Kubecon is that other emerging areas in the cloud infrastructure space, such as cloud cost management and FinOps, share many characteristics of platform engineering. It's likely these areas will converge over time. Many of these new products and platforms meet the need for better visibility and compliance over growing cloud environments.

Therefore, the next phase of platform engineering involves integrating IaC and IDP tools, as well as Kubernetes management and cost control, to drive better automation of multicloud and hybrid cloud infrastructure. Platform engineering and IaC can aid in the adoption and configuration standardization of multicloud and hybrid strategies with a standardized set of tools that can be used by DevOps, engineering, networking, and security teams.

## Platform Engineering and IaC Leader to Watch

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