



Deliver applications efficiently

How to add resilience, manageability, observability, and a security focus to your processes to optimize development



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Introduction

The software landscape is evolving rapidly, largely because organizations across the world are using IT as a key competitive differentiator. Yet as applications become more powerful, they also become more complex to create, test, run, deploy, and observe. So too does the development of distributed systems, which not only require more resources to build, but present more security vulnerabilities to exploit.

Even as teams add more people to work on these larger projects, IT leaders face challenges that can't simply be fixed with more workers, as no single individual has a total view of the sprawling project nor can a single individual master the sheer number of technologies available today.

Development teams find themselves navigating a wide range of choices, each promising to be the next linchpin in effective application delivery. However, this abundance often leads to decision paralysis, inefficiency, and a lack of consistency across products and processes, all of which can make it difficult to meet software delivery schedules and release dates.

Faced with these challenges, teams lose development productivity as both human and technical resources are devoted to managing the complexity of the project.

An internal developer platform (IDP) addresses these challenges by consolidating development process elements, reducing workflow friction, and fostering internal collaboration. Simplifying onboarding and learning lets teams focus on accelerating development of software solutions, which increases developer productivity, and provides golden templates or security checks to help make sure that the software developed does not introduce security vulnerabilities when deployed during all phases and different environments.

In this e-book we will explore how these challenges came about, how an IDP empowers platform engineers and helps boost productivity within their development teams, and how Red Hat® Developer Hub and Red Hat Trusted Software Supply Chain can fulfill a team's IDP needs.

Chapter 1

The current landscape of application development

More options, more complexity

How the problem of complexity became a reality

Trends in application development point towards cloud-native architectures, microservices, and an ever-increasing reliance on open source technologies. These shifts offer considerable benefits, such as enhanced scalability, flexibility, and speed in deploying new features. However, they also introduce substantial complexity in managing and maintaining application portfolios, particularly as the variety of available tools continues to expand.

This complexity is evident in the management of these modern applications, where development teams are tasked with integrating a broad array of services and technologies. This often results in a fragmented internal development ecosystem where the oversight and integration of numerous independent services can be overwhelming, creating nonstandard combinations which aren't sustainable in the long term. As teams incorporate more open source technologies into their stacks, the challenge of ensuring integration and ongoing support becomes more pronounced. Additionally, managing the constant influx of people in each development team also negatively impacts productivity. New members need to learn the stack the team is actually using, get access to proper services, and be aware of the application programming interfaces (APIs) available to integrate with the current work.

The result of complexity on development teams

The primary challenge surfaces when too many available options lead to a fragmented development process across the whole organization. This fragmentation is not merely about the selection of technologies, but their integration into cohesive workflows to help the development teams (either internal or third parties) do their daily tasks.

And once the original development teams transition off projects, subsequent teams often struggle with undocumented processes, unsupported or incompatible tools, and a collection of disparate systems that were never designed to work in concert. The result is a significant drain on productivity, innovation, and focus, detracting from the core business objective of application development.

Moreover, as organizations scale and evolve, onboarding new team members becomes increasingly cumbersome. Inconsistencies in onboarding experiences and a lack of standardized practices compound the inefficiencies, leading to protracted project timelines and diminished output quality. This chaotic environment not only hampers productivity, but also impacts the culture and strategic planning of development teams.

The consequences of continuing on as is

Seventy-three percent of developers say they have experienced burnout during their career, and those that have often point to the ineffective use of an integrated development environment as something that correlates with their burnout.¹

According to IDC, developers eventually hit a threshold where they cannot improve. This leads to frustration, errors, and stagnated growth. Research suggests that 60% of a developer's time is wasted on operational responsibilities rather than spent on writing code. This is up from 51% in 2022.²

Additionally, as this complexity grows, it increases the number of vulnerable points in the software supply chain, while obfuscating those vulnerabilities to those working to protect it.

Platform engineering emerges as a crucial discipline in this context, designed to streamline the development and management of these complex systems by building toolchains and workflows that power self-service capabilities for software engineering organizations.

By standardizing development processes and establishing a robust governance framework, platform engineering helps mitigate the risks associated with the diverse choices development teams make. It works to make sure that applications are not only built with efficiency and trust, but are also maintainable long after the original developers have moved on.

¹ ["Developers' Lifestyles,"](#) JetBrains. Accessed 21 Aug. 2024.

² IDC Report. ["Developer View 2023: Worldwide Survey Findings,"](#) Document #US51065023, July 2023. (Payment required)

Chapter 2

Development solutions to overcome complexity

Finding order in chaos

How organizations are trying to solve the productivity challenge

To address the challenge of a more complex, fragmented, and sprawling development process reducing developer productivity, teams are adopting several techniques, tools, and processes.

Many IT organizations are designating platform engineers. Platform engineering is a discipline that focuses on creating, managing, and optimizing the foundational technology platforms essential for modern software development. It encompasses more than just creating products—it's about supporting all aspects of IT and development work within an organization. This field comprises a broad range of activities aimed at helping make sure these technology platforms are scalable, sustainable, and capable of supporting the entire software development lifecycle.

In simplest terms, platform engineers are the people in charge of solving the productivity challenge by making sure development teams are focusing more on delivering software solutions, and less on grappling with organizational and technical overhead.

Platform engineering focuses on designing, building, and maintaining a robust Internal Developer Platform (IDP) based on the needs of all development teams in the organization, in order to ensure they are not blocked by technical overhead. In this discipline, the IDP is treated as a product and the development teams are considered customers.

The platform engineers (sometimes known as the providers, or the platform team) are continually assessing the needs of all development teams (internal or third parties) and work to make sure they are being served as quickly as possible. This ideally happens through a self-service approach, where development teams are continually being provided with a stack of supported, secure, resilient, and observable technologies. In this discipline, every development team gets a standard, secure, and preconfigured DevOps stack, which can be supported in any environment throughout the lifecycle of the software solution.

Components of an organization that impact productivity

Within each organization there are many different variables that can affect productivity, from the people involved, the structures within an organization, the tools being used, and the systems used to deploy them.

The people

Development teams are central to IT productivity, with their skills and expertise directly influencing the efficiency and quality of software production. The speed at which new members integrate into the team, known as onboarding speed, plays a crucial role in maintaining momentum and minimizing disruptions.

Security teams affect productivity by working closely with each member to embed security measures, tools, and best practices into the development process. Their responsiveness in addressing vulnerabilities quickly and effectively helps maintain a more secure development environment. Additionally, the shift-left model helps establish a security focus early in the development process wherever possible, in order to ensure consistent deployments that attempt to minimize risk by the time they get into production environments.

Platform engineers support development efforts by providing essential tools and frameworks that facilitate smooth and efficient workflows. They focus on optimizing processes to reduce friction and streamline development tasks.

IT decision-makers shape productivity by aligning development activities with business goals and ensuring that resources are allocated efficiently. Their strategic vision and prioritization of initiatives foster the overall success and productivity of the IT organization.

Processes and approaches

The documentation-as-code approach addresses several critical challenges in development. It enhances the accuracy and timeliness of documentation by integrating it directly into the development workflow. When development teams make changes to the codebase, they update the documentation simultaneously, which reduces discrepancies and improves the overall quality of both the software and its accompanying instructions or manuals. This practice not only helps maintain consistency between the software's functionality and its documented capabilities but also facilitates better communication and collaboration within development teams.

The documentation-as-code approach modernizes the role of documentation in software development. It shifts documentation from being an often overlooked or outdated part of the development process to a central, integrated component that keeps pace with the rapid changes of modern software projects. Key to this approach is allowing developers to sign off on what they build without jumping through hoops to make sure that the documentation remains current with what they've changed.

Software templates are another tool for productivity which act as a best-practice approach for templated challenges.

Software templates are predefined, optimized workflows and configurations designed to standardize and streamline the development process within an organization. These templates embody best practices, helping developers follow a consistent approach that reduces errors, enhances efficiency, accelerates project timelines, and adds consistency to an organization's security approach.

Software templates are beneficial because they minimize the cognitive load on development teams by automating the use of existing best practices and being offered as a self-service, which allows teams to focus on creating innovative solutions rather than navigating the complexities of setup and configuration. By reducing variability and promoting proven methods, software templates facilitate smoother collaboration and quicker onboarding of new team members, ultimately leading to more reliable and maintainable software projects with a stronger focus on security.

Security and vulnerabilities

In 2023, the percentage of organizations reporting to IDC that they were affected by software supply chain attacks increased by 241% year-over-year. And the same survey identified software supply chain vulnerabilities as a top application security exposure.³ By using software templates to systematize organizational standards and best practices, platform engineering teams can help make sure the DevOps pipeline has a security mindset.

However, simply having software templates might not be enough. Teams need a tool that links the standards set out in the software templates and codified in an IDP, and makes the security guardrails part of everyday practice. Having a tool to maintain trusted software supply chains is essential for not only integrating security as part of the day-to-day development process, but also reducing the overhead of security while doing so.

Developer productivity metrics

However, even with all of these tools, tracking developer productivity is challenging. Simple metrics such as hours worked are near meaningless, as they don't account for time devoted to organizational overhead, or the quality of the development output.

As such, more specific metrics need to be tracked to get a good sense of overall productivity.

Here are a few that are commonly used (and logged through an IDP) to track how productive a development team is in an IT organization.

Code quality and security vulnerabilities

- ▶ **Code review metrics.** Monitors the number of code reviews conducted, the average time taken for reviews, and the number of issues found during reviews.
- ▶ **Number of security vulnerabilities.** Tracks the number of vulnerabilities found in the codebase, both during development and post-deployment.
- ▶ **Time to fix vulnerabilities.** Measures the average time taken to identify, prioritize, and remediate security vulnerabilities.

Collaboration and communication

- ▶ **Pull request metrics.** Tracks the number of pull requests created, the time taken to merge pull requests, and the number of comments or feedback provided on each pull request.
- ▶ **Internal documentation usage.** Measures the frequency of access to internal documentation, the number of updates made, and the consistency of documentation across teams.
- ▶ **Collaboration tool usage.** Monitors the usage of collaboration tools to assess how effectively teams are communicating and sharing information.

³ IDC Report. "[DevSecOps Adoption, Techniques, and Tools Survey 2023](#)." Document #US50137623, May 2023. (Payment required)

Platform engineering in practice

Red Hat has recently put platform engineering into practice working with a large bank in the Australia and New Zealand region (ANZ) during their upgrade to Red Hat OpenShift 4 and the bank chose a Platform-as-a-Product approach driven by GitOps. Our consultants helped the team design the Red Hat OpenShift platform with developer self-service as the key goal.

In only 8 months, the bank was able to speed up application onboarding through self-services, reduce wait times, internal tickets and errors, and achieve successful workload migration within the given timeframe without business disruptions.⁴

Development process efficiency

- ▶ **Cycle time.** Tracks the time taken from the start of development to the deployment of features.
- ▶ **Lead time.** Measures the total time from the creation of a task to its completion.
- ▶ **Deployment frequency.** Monitors how often code is deployed to production.

Automation and repetitive task management

- ▶ **Build and deployment automation.** Tracks the extent of automation in the build and deployment process, including the number of manual steps required.
- ▶ **Repetitive task automation.** Monitors the number of repetitive tasks automated, such as code linting, security checks, and environment provisioning.

Onboarding and knowledge transfer

- ▶ **Onboarding time.** Measures the average time taken to onboard new developers to the team.
- ▶ **Turnover rate.** Tracks the turnover rate of developers and the impact on team productivity.
- ▶ **Knowledge transfer effectiveness.** Monitors the frequency and effectiveness of knowledge transfer activities, such as documentation updates, training sessions, and mentorship programs.

Customer and business impact

- ▶ **Customer satisfaction.** Measures customer satisfaction related to software quality, feature delivery, and security.
- ▶ **Business objectives alignment.** Tracks the alignment of development activities with business objectives and the impact on business outcomes (e.g., revenue growth, market competitiveness).

Bringing the tools together

Red Hat helps ease the journey toward platform engineering with [products and services](#) that help make sure development teams are consistently productive. Red Hat gives platform engineers a curated set of comprehensive and supported technologies to use from bare metal, on premise, private and public clouds, and all the way to the edge of the network.

Red Hat connects these tools and helps make your application development more efficient through the Red Hat Developer Hub and Red Hat Trusted Software Supply Chain.

The Red Hat Developer Hub serves as a web portal that integrates a cohesive environment, and Red Hat Trusted Software Supply Chain offers tools that provide easy authentication of code and a software bill of materials (SBOM) for supply chain risk management. (A SBOM is a nested inventory, a list of ingredients that make up software components.)

This provides platform engineers the tools to allow development teams to focus more on software solutions and spend less time grappling with organizational and technical overhead.

⁴ ["Platform engineering for your IT team: How to get started,"](#) Red Hat, accessed 19 Aug. 2024.

How Red Hat helps improve developer productivity

A platform to optimize them all

Red Hat is uniquely positioned to help improve developer productivity, offering a set of tools that are integrated to allow platform engineers to design their own IDP and be able to consistently address the needs of all development teams in the organization. This means the tools designed to make development teams daily lives easier, such as Red Hat Developer Hub, interface directly with the application platforms (Red Hat OpenShift®) or the automation solution (Red Hat Ansible® Automation Platform). Additionally, Red Hat has a large ecosystem of partners that offer certified integrations, reducing the overhead for using any single tool.

Red Hat Developer Hub

An IDP aims to streamline and optimize how development teams operate. Red Hat Developer Hub is a sophisticated IDP for enterprise use, designed specifically to enhance productivity and reduce the technical and organizational overhead that developers encounter daily. Red Hat Developer Hub's open architecture allows platform engineers to customize and extend the portal through the added functionality of an ecosystem of plug-ins into a unified view. These plug-ins provide a consistent developer experience—from the inception of source code to the build, release, and deployment to monitoring.

When paired with the rest of the Red Hat Trusted Software Supply Chain, Red Hat Developer Hub helps reduce the complexity of development while also supporting the practice of securing the software supply chain throughout the whole development cycle process.

Organizations with multiple development teams often struggle with competing priorities, managing a diverse set of tools and technologies, and establishing best practices while adhering to security and compliance standards.

By adopting an IDP, organizations can address several challenges faced by development teams, including:

- ▶ **Standardization.** An IDP provides a standardized set of tools and services for all teams, reducing the risk of inconsistencies and errors.
- ▶ **Productivity.** An IDP helps automate the setup and management of development environments, configuration build pipelines, and deployment applications, allowing developers to focus on coding and faster feature delivery.
- ▶ **Collaboration.** An IDP offers a shared platform to enhance collaboration between development teams and other organizational parts, such as operations teams and security teams, thereby improving communication and collaborative efforts.

- ▶ **Onboarding and self-service.** An IDP accelerates the time it takes for new development teams to become productive and add value by providing them with the appropriate tools and enhancing their experience.
- ▶ **Scalability.** An IDP delivers a scalable platform that can grow with the organization, helping new teams to onboard quickly and helping make sure all teams have access to the same tools and services.
- ▶ **Governance.** An IDP can be used to establish a flexible framework that adheres to best practices and which follows security and compliance requirements, allowing for more effective monitoring and management of development environments.

Red Hat Trusted Software Supply Chain

Red Hat Trusted Software Supply Chain helps organizations add security guardrails to their software development lifecycle. So as organizations progress through the code, build, deploy, and monitor stages of software development, there will be tools and practices to identify, prevent, and remediate security issues before they get to production.

This works by Red Hat flagging open source dependencies in the code and intercepting critical vulnerabilities at the point of entry.

When a developer inserts a library into a codebase, vulnerabilities are highlighted inside the integrated development environment (IDE). From there, appropriate actions are listed right next to the vulnerability. The entire process is in a single interface and happens immediately, meaning that the developer does not lose focus or devote extra mental energy to making sure it happens.

Trusted continuous integration and continuous delivery (CI/CD) workflows then take code right from a repository and directly into a Kubernetes environment such as Red Hat OpenShift.

All of this is integrated into Red Hat Developer Hub and Red Hat Trusted Application Pipeline, making the process of managing security something that happens automatically as part of development without having to expend extra resources to implement it.

How Red Hat Developer Hub and Red Hat Trusted Supply Chain work as an IDP

Red Hat Developer Hub contains software templates that help build an enterprise-grade IDP on top of Red Hat OpenShift and layered technologies such as Tekton, ArgoCD, and Quay. And [Red Hat Consulting](#) works with teams to create software templates that serve as a starting point for onboarding user workflows and helping to offer self-service capabilities for developers.

By providing software templates and centralizing technology, Red Hat Developer Hub streamlines development through a unified and open approach.

- ▶ **Solutions curated for security and compliance abilities.** Red Hat Trusted Application Pipeline offers a full suite of verified and curated tools and components needed for operations teams to support developers—all in a centralized, consistent location. This results in increased productivity and simplified governance with self-service and guardrails.
- ▶ **Leading development experience.** Red Hat passes along expertise and experience to customers from our [ecosystem of partners](#) and open source projects.
- ▶ **Self-management and maintenance.** Red Hat provides access to a curated common suite of developer tools that help teams build cloud-native services and applications. This means that all the teams in an organization start with the same tooling, and less organizational time is spent on tool selection.
- ▶ **Support for critical bug fixes and new features.** Red Hat Developer Hub offers a centralized place for teams to access the latest versions of functionality, system architecture, and application documentation. Since updates can happen in a more uniform and systemic way, there are fewer gaps where issues can arise.
- ▶ **Preintegrated tools.** New tools and services (via Red Hat Plug-ins for Backstage) are preintegrated. This means that extensibility and scalability are enabled for a single, consistent experience that ties together infrastructure tooling, resources, standards, owners, contributors, and administrators.

Red Hat Consulting

If you need additional guidance for you and your organization, Red Hat Consulting provides proven blueprints and the skills needed to effectively build a comprehensive and consistent platform for developing and delivering applications. To learn more about how Red Hat Consulting can help accelerate delivery for platform and application teams, download the [Modernize the hybrid cloud developer experience e-book](#).

Additional Red Hat solutions to improve productivity

Red Hat OpenShift

Red Hat OpenShift enhances developer productivity by providing a consistent and scalable platform for deploying and managing applications. It simplifies the development process through built-in automation for CI/CD, facilitating faster and more reliable deployments. Red Hat OpenShift security features integrate into the development workflow, making sure security is factored into the development cycle.

Red Hat Ansible Automation Platform

Ansible Automation Platform automates routine tasks such as provisioning, configuration management, and application deployment, which fosters consistency and reduces errors. This integration allows teams to collaborate more effectively, as they can rely on standardized, automated processes to maintain a stable and secure development environment.

Red Hat Enterprise Linux

Red Hat Enterprise Linux® improves developer productivity by providing an industry-standard stable and security-focused environment. The platform supports a wide range of development tools and integrates directly with other Red Hat products, helping developers to work efficiently across different stages of the software development lifecycle.

Red Hat partner ecosystem

If the solution your organization needs to improve developer productivity isn't provided by Red Hat, there's a good chance that a solution lies with a Red Hat partner. Red Hat's extensive ecosystem of partners offering certified solutions that integrate with Red Hat platforms means that no matter which tool you want to use, it will likely work as part of a single solution with Red Hat platforms.

Conclusion

The leaders in today's marketplace are defined by how fast, stable, resilient, and security-focused their software solutions are delivered to end users. The only way to test new ideas in order to be ahead of the competition and constantly delivering innovation. Software is the element that allows that to become a reality.

Software development demands solutions that optimize processes to increase productivity. This means not only implementing the newest and most powerful technologies, but also ensuring your organization is equipped to use them efficiently and effectively.

As organizations continue to navigate the complexities of digital transformation, IDPs like Red Hat Developer Hub are crucial for sustained growth.

Adopting the Red Hat Developer Hub and Red Hat Trusted Software Supply Chain helps organizations address the fragmentation often encountered in modern software development environments through integrating essential tools and services into a single platform.

Ready to get started?

[Learn more](#) about the Red Hat Developer Hub or [set up a trial](#) today.

Additional resource

- ▶ Self-paced training: [Red Hat OpenShift skill paths](#)



About Red Hat

Red Hat is the world's leading provider of enterprise open source software solutions, using a community-powered approach to deliver reliable and high-performing Linux, hybrid cloud, container, and Kubernetes technologies. Red Hat helps customers develop cloud-native applications, integrate existing and new IT applications, and automate and manage complex environments. [A trusted adviser to the Fortune 500](#), Red Hat provides [award-winning](#) support, training, and consulting services that bring the benefits of open innovation to any industry. Red Hat is a connective hub in a global network of enterprises, partners, and communities, helping organizations grow, transform, and prepare for the digital future.

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