Today's business environment requires organizations to transform into software companies. This embrace of software and digital solutions involves a recognition of the changing nature of software and, in particular, the increased importance of open source technologies.

**How Open Source Is the Key to Innovation, Productivity, Collaboration, and Transparency Within the Digital Enterprise**

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**Written by:** Arnal Dayaratna, Research Director, Software Development

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**Introduction**

Today's business environment requires organizations to intensify the cadence and scope of their digital transformation initiatives to remain competitive. Confronted with a business landscape in which competitors leverage digital solutions to solve business problems, organizations from all industry verticals are transforming themselves into software companies. By enhancing their capabilities to develop digital solutions, organizations seek to demonstrate greater agility, velocity, and intelligence regarding their ability to respond to customer needs and evolving market dynamics. This embrace of software and digital solutions involves a recognition of the changing nature of software and, in particular, the increased importance of open source technologies.

Open source technologies leverage a commitment to distributed peer review, transparency, and collaboration that empowers a decentralized network of individuals and organizations to contribute to an application. The decentralization specific to open source technologies creates releases, versions, forks, and product road maps that facilitate innovation.

As organizations transform themselves into software companies, every company will need to become a highly innovative software organization that is defined as an enterprise that deeply integrates open source technologies, methods, and culture into its daily business operations.

Highly innovative software organizations will become the quintessential example of enterprises that have the ability to rapidly create digital solutions that solve pressing business problems and continuously innovate. IDC believes highly innovative software organizations excel at implementing insersource as well as open source supply chain management; compliance, security, and risk management; support for open source maintainers; and innovation. Some key attributes of highly innovative software organizations are discussed in the following sections.
Innersource

Definition: Innersource is a development methodology whereby engineers build proprietary software using best practices learned from large-scale open source projects.

The practice of innersource is characterized by the following:

» Developers routinely collaborate with colleagues both within and beyond their immediate team or organizational structure.

» A culture of transparency, mentorship, and continuous innovation characterizes the ethos of the enterprise.

» The organizational culture celebrates decentralized collaboration and distributed innovation, thereby departing from organizational cultures that prioritize individual contributions and accomplishments.

» Developers have the ability to create new repositories that can be shared across an organization and discovered by team members with relevant access credentials.

» All knowledge artifacts are housed within a standardized engineering system but not necessarily one repository. This standardization of the engineering platform facilitates the development of best practices for storing, retrieving, and updating artifacts.

» Documentation of best practices, decisions, and notes made by developers is publicly available or accessed based on roles. Importantly, this documentation is tagged and indexed in ways that allow developers to rapidly search textual notes and decisions of interest.

Open Source Supply Chain Management

Definition: Open source supply chain management is a set of activities required to ensure the availability of high-quality, secure open source software as components of an enterprise’s application development initiatives.

Open source supply chain management involves the following:

» Ensures that team members have access to a repository for open source code within the enterprise

» Provides knowledge of best practices for collaborating with team members and colleagues

» Designates one or more developers as open source specialists who are available to respond to questions from team members about the use of open source software

» Recognizes and rewards employees who demonstrate innovative use of open source technologies in their professional work

» Understands the origins of open source software used within an enterprise by obtaining insight into licenses, security vulnerabilities, and the overall health and safety of each component
» Identifies the availability of relevant open source technologies to ensure that highly innovative software organizations have the opportunity to use these technologies as desired (For example, an organization interested in leveraging open source tools for quantum computing use cases would do well to understand if relevant open source tools are available.)

» Cultivates communities that specialize in topics of interest to the highly innovative software organization in question (This involves investing in outreach initiatives to developer communities that promote interest in open source development related to select topics.)

**Compliance, Security, and Risk Management**

**Definition:** In the context of open source software, compliance, security, and risk management refer to the use of tools and processes to assess compliance- and security-related risks as well as strategic, financial, and operational risks that may be associated with open source software.

Compliance, security, and risk management in open source software entail the following:

» Use of data-driven methods to identify software components or processes that represent a risk to compliance or security or pose broader strategic, financial, or operational risks

» Automated processes that facilitate implementation and monitoring of compliance at scale

» Automated remediation of security- and IP-related risks that minimizes the opportunity for risks to escalate and acquire broader ramifications

» Proactive identification of security breaches and vulnerabilities

**Support for Open Source Maintainers**

**Definition:** Support for open source maintainers refers to financial and operational support for open source maintainers who assume the responsibility of maintaining an existing open source project.

Support for open source maintainers includes the following:

» Opportunities for open source maintainers to receive financial support for their contributions

» An infrastructure, in the form of a code repository or otherwise, whereby open source maintainers can document best practices regarding the use of open source software that they maintain (This infrastructure will streamline the ability of end users to locate information regarding the use of open source software, thereby minimizing questions posed directly to the open source maintainer involved.)

» An infrastructure, in the form of a code repository or otherwise, that facilitates communication between open source maintainers to enable them to share best practices, experiences, and insight regarding how to maintain open source technologies and communities

» Cultivation of a culture of ownership whereby consumers of software understand that they themselves are accountable for its continued well-being (In such a culture, consumers of software support maintainers of open source projects by finding bugs, sharing enhancements, and providing financial support.)
Innovation via Collaboration

» Developers can leverage insights from the community to accelerate their development efforts by understanding how other developers have solved related problems and challenges.

» Code reusability empowers developers to harness code contributions made by other developers.

» Collaborative development fosters a culture of transparency and meritocracy.

» Developers can focus on coding business logic as opposed to challenges.

Benefits of Open Source

Innovation
Open source technologies drive innovation because the decentralized quality of code contributions means that developers from a multitude of organizations, industry verticals, and geographies can contribute. Because open source software inherently embraces contributions from large and diverse groups of developers, an open source community of developers is more likely to make innovative code contributions than a closed source community of developers such as those within a specific enterprise.

Transparency
One of the key benefits of open source technology is visibility into both the source code and its versioning history. This transparency empowers users to modify the source code or test its relevance for additional use cases and scenarios. Increased transparency also empowers developers to update and modify source code to render it more stable, secure, and reliable across a multitude of deployment environments. All this means that, depending on the size, quality, and engagement of the corresponding open source community, open source software has the potential to reap the rewards of decentralized insight and contributions from community members.

Lower Costs
Open source software is typically free to download and is subsequently less costly than proprietary software. That said, enterprises must consider the total cost of the open source software, including the cost for services and support, whether internal or through a third party.

Longevity
The decentralized quality of open source software allows communities of practitioners to access the source code. As a result, open source software is thought to have greater longevity than proprietary software because it is less likely to be neglected or abandoned than software developed by a closed community of creators. In the event that the stewards of an open source software project are unable to maintain that project, the community can take responsibility for updating the software and ensuring its continued relevance to users.
**Trends**

IDC has observed the following key development trends related to highly innovative software organizations:

» One of the key trends in modern application development is the transformation of all organizations into software companies. Given the importance of open source software to the contemporary application development landscape, the transformation of organizations into software companies means that all companies are taking steps toward becoming highly innovative software organizations.

» Rapid adoption of DevOps — which IDC defines as practices that promote agile, continuous application code delivery; automated self-service infrastructure delivery; and close collaboration across development, line-of-business, and IT operations roles — is a key attribute of a highly innovative software organization. According to a worldwide IDC survey of developers, 67% of organizations have adopted DevOps practices within the past three years, while 19% of organizations plan on adopting DevOps within the next 12 months.

» Increased awareness of security and compliance challenges related to software and data has intensified interest in the decentralized quality of open source software development and its ability to promote transparency as well as security- and compliance-related innovation.

» Increased cloud adoption has facilitated the need for enterprises to seek software solutions that can be deployed across a multitude of cloud environments.

» Organizations are incorporating open source technologies into proprietary software as a means of using solutions that have been subject to the scrutiny of the open source community. By reusing open source code, developers can increase development velocity, improve productivity, and focus their efforts on developing components of their digital solution in which they have dedicated expertise.

In a worldwide IDC survey of developers, open source, sharing functionality, automation, integrated security, and collaboration were cited as the most important attributes of developer tools as measured by their ability to enable developers to complete their professional work successfully (see Figure 1).
**FIGURE 1: Core Attributes of Highly Innovative Software Organizations**

*Q. Which of the following attributes of developer tools are most important to complete your professional work effectively? (Top 2)*

![Diagram showing the most important attributes of developer tools](image_url)

- Open source
- Pair programming
- Sharing functionality
- Rich user experience
- Code abstraction (low code/no code tools)
- Expedited access to APIs
- Integrated CI/CD functionality
- Intelligent development suggestions
- Automation
- Integrated security
- Collaboration

$n = 2,500$

*Source: IDC’s PaaSView and the Developer Survey, April 2019*

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**Considering GitHub**

In recent years, GitHub has transformed itself from a code repository to a platform that provides developers with solutions that enhance modern application development. In particular, GitHub has led the development of tools, technologies, and processes that underpin the proliferation of highly innovative software organizations. GitHub’s planet-scale tools for fostering collaboration have been critical to transforming the culture of software development into a distributed, decentralized, collaborative experience involving developers all over the world. By providing a foundation for both the maturation of highly innovative software organizations and global collaboration between developers, GitHub has spearheaded the transformation of contemporary development into a deeply collaborative experience that facilitates innovation, accelerates development, and enhances the education of developers. Importantly, enterprises can use GitHub to increase cross-company internal collaboration while leveraging contributions from the broader open source community.

According to the company, GitHub Enterprise enables enterprises to incorporate best practices from open source software development into their internal practices while using a secure and compliant development platform. Organizations can use GitHub Enterprise to securely manage user and team access to private and public repositories enabling collaboration internally or externally, similar to open source projects. GitHub Enterprise also helps organizations understand their open source dependencies, including licensing types and security vulnerabilities. The dependency
insights dashboard provides visibility into how a security vulnerability affects a larger set of digital assets. If a vulnerability in a dependent open source component is found, GitHub can automate a security fix to accelerate remediation.

Meanwhile, GitHub’s Package Registry allows organizations to host packages for applications in one place and use them as dependencies in subsequent projects. GitHub's Package Registry empowers developers to publish and find packages alongside their source code. Developers can publish private packages for internal use by their organization or public packages that can be used by anyone on GitHub.

GitHub also provides services that bolster the security of enterprise code and packages stored within GitHub infrastructure. Services include secure coding workflow features such as protected branches, required reviews, and the Checks API. GitHub contains additional features such as audit logs and permissions reports to help enterprises maintain compliance with policies and practices. Further, GitHub maintains a secure and compliant hosting platform that is FedRAMP, AICPA SOC 2 and SOC 1, and ISAE 3000/3402 certified.

Challenges

The principal challenge that GitHub will need to overcome involves rebranding itself from a code repository into the premier platform for modern application development. Additionally, GitHub will need to focus its mission and scope given the enormity and heterogeneity of contemporary application development technologies. The speed with which development technologies change makes it challenging for GitHub to become a one-stop shop for application development tools. That said, if GitHub were able to focus on providing tools and technologies for stewarding the maturation of highly innovative software organizations, it stands a much greater likelihood of success than if it were to take on its shoulders the mantle of providing application development tools for any application or use case.

Conclusion

Highly innovative software organizations, defined as enterprises that seamlessly integrate open source technologies, processes, and culture into their digitization practices and methodologies, have become the archetypal example of how contemporary enterprises create modern software. That said, enterprises need guidance about best practices regarding implementing insersource practices as well as the management of open source supply chains; compliance, security, and risk management; and tools for maintainers of open source projects. IDC understands that an organization’s transformation into a highly innovative software organization is a critical step of the journey to becoming a software company. The ability to effectively harness the capabilities of open source technologies enables organizations to innovate rapidly and see further than others by "standing on the shoulders of giants."  

1. Tools and technologies that help

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1 The British physicist Isaac Newton famously remarked that he could see further than others because he stood on the "shoulders of giants" in the form of his physicist peers.
organizations integrate open source technologies, methodologies, and practices into their daily operations will be critical to attempts by organizations to disrupt themselves by means of digital transformation initiatives.

About the Analyst

**Arnal Dayaratna, Research Director, Software Development**

At IDC, Dr. Arnal Dayaratna focuses on software developer demographics, modalities of software development, trends in programming languages and other application development tools, and the intersection of these development environments and the many emerging technologies that are enabling and driving digital transformation. Dr. Dayaratna’s research examines how the changing nature of software development relates to broader trends in the technology landscape.
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MESSAGE FROM THE SPONSOR

**GitHub Enterprise** helps over two million organizations bring the code, practices, and scale of the open source community into their organizations with a secure and compliant platform. GitHub Enterprise turns organizations into highly innovative software organizations in three key ways:

» Safe use of open source: engage the open source community to find code that accelerates projects, learn best practices for collaborating at scale, and advance open source projects

» Innersource: build internal communities to share and reuse code, search for skills across their teams, and scale collaboration, without losing visibility and control

» Security and compliance: create workflows to develop secure code, automate vulnerability detection and remediation, and manage risks from open source dependencies.

GitHub Enterprise is a secure development platform with thousands of pre-built integrations to the industry’s best tools, automated workflow actions, and robust APIs to fit any environment. Examples of customers that use GitHub Enterprise include **SAP, Nationwide**, and **Adeo**.

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