

SOFTWARE DEVELOPMENT APPROACHES

RECAP

OFFICE OF TECHNOLOGY STRATEGIES (TS)

INTRODUCTION

This Tech Insight Recap revisits three previous Tech Insights to highlight the importance of software development approaches. This recap specifically addresses previous Tech Insights on open source software and development (Volume 1, Issue 12); device-independent development (Volume 1, Issue 7); and development operations (DevOps) (Volume 3, Issue 3). This recap examines how all three topics interconnect at the Department of Veterans Affairs (VA). This Tech Insight begins with an overview of open source software and development, followed by a summary of device-independent development, and a discussion of DevOps. Finally, the recap addresses the interconnection of these topics and how they benefit VA.

OPEN SOURCE SOFTWARE AND DEVELOPMENT

Open source refers to software that provides its source code freely to anyone to study, modify, or even incorporate into other software programs. Open source software also includes the compiled, executable version as initially programmed by the original developer. While closed or proprietary software licenses restrict duplication, distribution, and modification of software, open source licensing ensures there are little to no restrictions on how users interact with the software or its source code. There are also open source certification processes, conducted by the [Open Source Initiative](#) (OSI), which provide assurances to users that software adheres to open source licensing and uses open standards. Internal to VA, the [Open Source Electronic Health Record Agent](#) (OSEHRA) has a certification process. This way, one organization's developer can implement changes to a large, multi-adopter system while ensuring it benefits other users or does not limit existing functionality.

Open source development relies on the community of users (who have the same "status" as developers) to focus on finding bugs, applying fixes, and increasing functionality of software. In addition to the community, open source development is defined by a goal to "release early, release often," which open source advocate Eric Raymond popularized in his book [The Cathedral and the Bazaar](#). This practice allows developers to catch bugs early in the development process and fix them immediately, instead of waiting for the bug to (potentially) crash the completed code later. Projects are also based on smaller components or modules of

the larger software code, and changes are integrated into the larger code base on a regular basis. Ultimately, the purpose of this development cycle is to focus on the community, involving all programmers, testers, and users as much as possible, which increases the chance that both the code and the resulting functionality meet the highest expectations.

Open source is not always suitable for the types of applications used by VA and its employees, but many of the business needs of providing health care and benefits to Veterans are common to other communities across the federal and private sector. Utilizing open source software allows these communities to share best practices and deliver functionality that best serves the end-user or patient, and promotes interoperability between partners serving similar populations (e.g., VA and the Department of Defense combining electronic health records).

DEVICE-INDEPENDENT DEVELOPMENT

Device independence is the property of an application allowing it to run on different devices regardless of the device's hardware or operating system. The applications each user runs in order to perform these functions must be able to run on any device, from the traditional workstation to the constantly upgraded smartphone. First-generation mobile applications (apps) had to be developed for specific devices because device-independent standards and tools enabling applications to use device features like cameras and microphones did not exist; building user interfaces (UI) that automatically reconfigured themselves for different screen sizes was complicated and required a lot of code; and securing mobile apps was difficult. Numerous open standards and open source tools make it not only possible, but relatively easy to use local device hardware features, build "responsive" user interfaces, and implement device-independent Federal Information Processing Standard (FIPS)-compliant security with original [HTML5](#), [CSS](#), and [JavaScript](#).

Using service-oriented architecture (SOA) concepts, device-independent development decomposes these resources into services, either provided externally or internally to the device. In this way the application no longer relies on how such features are implemented in a device, but on how the application accesses or uses the resources as services. Developers use a [platform-as-a-service](#) (PaaS) to provide processing resources on which the application will run; and each app can rely on different PaaS implementations, further increasing the agility of the application. Device independence is an important technology strategy for VA as time and technology moves forward. The key benefits to adopting a device-independent development framework are improved information security, increased information agility, and decreased time and cost.

DEVELOPMENT OPERATIONS

Development operations (DevOps) is a software industry concept that has gained momentum across the public and private sectors to improve IT service delivery to customers. DevOps recognizes the interdependence between the programming activities of software development and the IT operational environment that supports software deployment. Even the name of the DevOps concept joins the two work streams, disallowing them to stand in isolation from each other. DevOps is closely associated with the agile software development methodology that began in 2001. The IT concept of “agility” means mobility, nimbleness, and quickness. To be agile is to effectively respond to change. In software development, agility is required to handle the inevitable changes that occur throughout the project lifecycle.

In organizations where there is a separate IT operations department and even a separate software testing function, there is often poor communication between the groups. Therefore, in many organizations, there is a passing of a baton from software development to IT operations that carries an [“I’ve done my job, now it’s your problem”](#) attitude. Instead of development opening up a work ticket and waiting for IT operations to complete testing and other deployment efforts, much of these activities are automated so that developers can accomplish the functions themselves.

The DevOps principles demand strong communication between the members of the team and a strong understanding of business goals. More than the assistance that software automation tools provide or any special technique, the success of DevOps requires a cultural shift to improve collaboration between developers and IT operations professionals, including those responsible for quality assurance (QA), testing, and security.

CONCLUSION

Open source software and development, device-independent development, and DevOps are critical improvements for software lifecycles. At VA, these three software development approaches have increased IT communications and security. Investing in these software development solutions as well as using open source development, device-independent development, and DevOps within VA will help VA adapt to changes in how Veterans want to access their benefits and how VA delivers care to meet their needs.

Read about more software and technology topics in [TS Tech Insights](#). With questions regarding software development approaches, don’t hesitate to [ask TS](#) for assistance.

TS TECH INSIGHT SERIES

The monthly Tech Insight series aims to help readers make better decisions and be more informed customers (of Office of Information & Technology's products and services) by providing them with high-level overviews of technology issues that impact or will impact VA's Information Technology (IT) environment. Tech Insights introduce topics in an easily digestible fashion by presenting background information on the topic, clearly explaining its importance within VA, and providing recommendations for success from TS. View all TS Tech Insights [here](#).

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