

Distributed Learning - Diagnostic, Advisement, and Technical  
Research (DL DART) Support Services

Adobe Flash Technology in Army Distributed Learning Products  
Research Report

Provided for  
The Army Distributed Learning Program  
(TCM TADLP)



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## Version History

Version	Revision Date	Description
1.0	24 August 2015	Initial release

## **Introduction**

This document provides an overview of the current state of the Adobe Flash Player plugin used to display Adobe Flash content in web browsers, and the industry departure from Flash technology in favor of alternatives such as HTML5 technologies. The document begins with a discussion of Flash's capabilities and long-standing issues, and continues with a discussion on the effects developers shifting to HTML5 technologies may have on Army distributed learning products.

This document also focuses on Flash technology and the Flash Player plugin for use in web browser software. Flash technology has applications outside of web browsers, such as the Adobe Integrated Runtime (AIR) runtime for use in desktop-oriented products; however, the use of Flash technology in environments outside of the web browser is outside the scope of this document.

## **The Decline of the Flash Player on the Web**

Flash Player usage on the web is in the midst of a continuous decline that began in 2010 due to influence from major players in the technology industry. Apple Inc.'s Steve Jobs authored an essay publicly displayed on the company's website in April 2010, explaining why Flash technology would no longer have support on Apple products, such as the iPhone and iPad. Jobs cited many of the standing industry criticisms of Flash technology, including the proprietary nature of the technology, limited application on mobile devices, and poor reliability, security, and performance.<sup>1</sup> Flash technology, while the effective standard for rich-media web applications at the time, was subject to numerous criticisms because of the issues mentioned in Jobs' essay.

The same year shifted industry focus to the emergent HTML5 technologies which provided most of the capabilities of Flash while addressing the long-standing issues (i.e., performance). Industry concerns about Flash technology amplified further as HTML5 technologies quickly became a viable alternate for creating rich web content. Despite its issues, Flash served as the standard for capabilities such as streaming audio and video, and interactive rich-media applications until HTML5's browser-integrated capabilities came into existence.

## **Issues with Flash Technology**

Flash technology in the form of the Flash Player brings with it a variety of issues from security vulnerabilities to poor support for platforms outside of desktop computers. While some issues, such as platform availability, were not large concerns in the largely pre-mobile Internet, other issues such as security vulnerabilities have persisted throughout Flash's entire lifespan.

### **Security**

Security vulnerabilities are an ever-present threat with the Flash Player. The Flash Player has a history of high-criticality vulnerabilities that often create the possibility for potential attackers to hijack and control computer systems with the Flash Player installed. The frequency of critical bug fixes issued

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<sup>1</sup> Jobs, S. (2010, April 1). Thoughts on Flash. Retrieved August 20, 2015, from <https://www.apple.com/hotnews/thoughts-on-flash/>

through updates to the Flash Player software illustrates the general level of Flash Player vulnerability. Adobe issued fixes for over 160 bugs with the Flash Player between 14 January 2015 and 11 August 2015 – an average of five bugs per week.<sup>2</sup> The latest large group of fixes Adobe issued on 11 August 2015, included bug fixes for 34 issues, “that could potentially allow an attacker to take control of the affected system.”<sup>3</sup>

The Flash Player software constitutes an additional point of risk, as potential exploits in the software constitute another entry point for attackers aside from any host web browser vulnerabilities. Additionally, maintenance required to address vulnerabilities in the Flash Player is outside the scope of browser vendors, and requires users to balance updating both their browser and Flash Player plugin separately. It is for this reason, among others, that the industry now trends toward integrated capabilities such as HTML5 technologies that do not carry the same security risk associated with third-party external plugins. A few current browsers such as Google Chrome and Microsoft Edge now contain integrated Flash Player support as well, which means users will not have to install and maintain the Flash Player software on their own.

## **Performance**

The Flash Player provides its rich-media capabilities at the cost of being resource-intensive. High demand on system resources creates varying degrees of performance issues on desktop systems depending on factors such as processor speeds and available memory, but performance on portable platforms with limited battery life is a consistent issue with Flash technology. Flash technology was produced for an Internet largely viewed through desktop computers with capable hardware necessary for providing rich-media capabilities. The ubiquity of laptops and mobile devices (i.e., smart phones) presents a challenge in the modern day, where battery life is limited and resource-intensive software (i.e., Flash Player) act to slow down and limit usage of portable platforms.

Flash content is still common on many webpages, which has prompted vendors like Google to introduce functionality such as the ability to treat content requiring the Flash Player as opt-in content in the Chrome web browser; this setting is active by default for performance reasons.<sup>4</sup> HTML5 technologies provide browser-integrated rich media capabilities that allow the same application of Flash technology, but with better speed and efficiency. Consequently, Flash technology has increasingly little room in web development, especially on mobile devices. Adobe’s last version of Flash for mobile devices was 11.1, released in 2011 with plans to continue support for that version, but not for the release of any future versions of the Flash Player on mobile devices.<sup>5</sup>

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<sup>2</sup> Flash Tester. (2015, August 13). Retrieved August 20, 2015, from <http://www.flashtester.org/>

<sup>3</sup> Adobe Security Bulletin. (2015, August 11). Retrieved August 20, 2015, from <https://helpx.adobe.com/security/products/flash-player/psb15-19.html>

<sup>4</sup> Better battery life for your laptop. (2015, June 4). Retrieved August 20, 2015, from <http://chrome.blogspot.com/2015/06/better-battery-life-for-your-laptop.html>

<sup>5</sup> Chambers, M. (2011, November 11). Clarifications on Flash Player for Mobile Browsers, the Flash Platform, and the Future of Flash. Retrieved August 20, 2015, from <http://www.mikechambers.com/blog/2011/11/11/clarifications-on-flash-player-for-mobile-browsers-the-flash-platform-and-the-future-of-flash/>

## Accessibility

Flash is a difficult platform on which to produce content capable of providing an accessible experience for users, which often results in Flash content that is incapable of meeting accessibility requirements. Flash content suffers from poor integration with assistive technology (i.e., screen reader software) due to two primary reasons. The first is the fact that content played through Flash Player is not native to web pages where the Flash content resides. The second reason is the potential dynamic nature of Flash content depending on how developers utilize Flash's timeline and scripting language, ActionScript, to create Flash content. Users often have no way to experience Flash content in a self-paced manner, and development work required to add accessibility features is often extensive and overlooked due to Flash's poor native accessibility features.

The Web Accessibility in Mind (WebAIM) organization maintains the following stance on the use of Flash when creating accessible content:

*“Due to lack of Flash support on mobile devices (particularly iOS devices), decreased support in many browsers, poor accessibility, and general transition away from Flash as a commonly-used web technology, using Flash is not generally recommended.”<sup>6</sup>*

Increasing usage of mobile devices means a larger market share of devices that are often unable to view Flash content at all. Furthermore, HTML5 provides integrated accessibility capabilities through use of the Web Accessibility Initiative - Accessible Rich Internet Applications Suite (WAI-ARIA), allowing content that does not require Flash Player plugins to provide effective accessible experiences to users.

## Platform Availability

Portable platforms (i.e., laptops and smartphones) represent a challenge for Flash content, as discussed in previous sections. Since 2012, Flash is virtually unavailable for use on the mobile web. The Flash Player is no longer available on Apple and Android devices which together account for over 95% of smartphone market share.<sup>7</sup> The need for highly-capable hardware to efficiently run Flash content further limits the available platforms and creates a scenario in which only desktop computers are capable of running Flash content, and only if the systems have adequate hardware.

## Moving Forward

HTML5 technologies have experienced rapidly increasing adoption into the mainstream since 2010. HTML5 content began to serve as an alternate, or replacement in some cases, to Flash-based content well before the HTML5 specification itself became a World Wide Web Consortium (W3C) recommended standard in October 2014, as HTML5-enabled browser adoption increased and leading companies adopted the technology.<sup>8</sup> While support for Flash content will continue to exist for years to come, more

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<sup>6</sup> Creating Accessible Flash Content. (2013, September 24). Retrieved August 20, 2015, from <http://webaim.org/techniques/flash/>

<sup>7</sup> IDC: Smartphone OS Market Share. (2015, May). Retrieved August 20, 2015, from <http://www.idc.com/prodserv/smartphone-os-market-share.jsp>

<sup>8</sup> Sheldon, P. (2012, August 7). HTML5 – Maturing Desktop Browser Support Opens The Door To Enhanced Commerce Experiences. Retrieved August 20, 2015, from [http://blogs.forrester.com/peter\\_sheldon/12-08-07-html5\\_maturing\\_desktop\\_browser\\_support\\_opens\\_the\\_door\\_to\\_enhanced\\_commerce\\_experiences](http://blogs.forrester.com/peter_sheldon/12-08-07-html5_maturing_desktop_browser_support_opens_the_door_to_enhanced_commerce_experiences)

and more of the content on the Internet is switching to the open, integrated, and platform-agnostic capabilities that HTML5 technologies provide instead of third-party software, such as the Flash Player.

## **The Effect on Flash's Decline on Army Distributed Learning Products**

Though the Internet as a whole is able to shift the nature of its rich-media content, certain environments such as the U.S. Army's distributed learning library are unable to undergo technological changes as rapidly. In the case of Flash content, the Army, and Department of Defense as a whole, will be able to continue support for legacy Flash-based distributed learning products, while using newer technology to fit the future needs of the organization.

## **Effects on Current Army Distributed Learning Products**

The Army currently has a significant number of legacy Flash-based distributed learning products, as well as current and future products, which will still be Flash-based. While a portion of new distributed learning products is HTML5-based, a majority of past and current Army distributed learning products employ Flash technology. Consequently, there is a strong requirement for the Flash Player plugin on systems accessing Army distributed learning products in the future. However, future-focused distributed learning products do not require the use of Flash; especially considering the Army's recent focus on mobile device support.

Support for the Flash Player plugin on desktop devices, which includes new versions of the software, is ongoing and Adobe actively updates and refines its software. Use of Flash technology for future Army distributed learning products will depend on the intended audience (e.g., Servicemembers with access to training facilities, or Servicemembers with mobile devices in the field).

## **Future Web Browser Technology**

Despite an overall trend away from Flash technology in web content, the Windows 8 and Windows 10 operating systems include integrated Flash Player support in the Internet Explorer and Edge web browsers. The Google Chrome web browser includes an integrated Flash Player plugin. These browsers contain an integrated Flash capability precisely because of the amount of extant Flash content on the web, and the resulting need to give users the ability to view the content. However, systems currently using Windows 7 with all versions of Internet Explorer rely on the external version of the Flash Player plugin. Support of Flash content will still be widely available through integrated Flash Player support as Army systems migrate to Windows 8 and Windows 10 in the future.

## **Development Practices for Future Army Distributed Learning Products**

The rich media capabilities Flash provides are achievable using HTML5 as an alternate technology. Trends in web development over the past five years have been toward focal points of the modern web (open technology, full mobile platform support, and a departure from third-party technologies, etc.) that provide functionality not native to HTML5. As Army distributed learning requirements evolve to support a wider range of devices, alternative technology to Flash will become a necessity.

## **HTML5 Technologies**

HTML5 and its associated technologies provide the core rich-media capabilities of Flash, such as audio and video playback, required for Army distributed learning products. HTML5 capabilities differ from Flash through a basis on open standards, functionality that is native to the web browser, and support for mobile devices. Although future distributed learning products can take full advantage of newer technology, such as HTML5, factors such as web browser availability in the Army environment require Flash capabilities where support for newer technology is unavailable. Since Army technology requirements mean older versions of Internet Explorer and the compatibility view feature are still widely used, HTML5 support is often absent or limited for certain users. Developers of distributed learning products will need to employ development techniques allowing for Flash fallbacks when HTML5 support is not present.

## **Summary**

The capabilities Flash provides for web content were well suited for a time when desktop computers constituted the vast majority of the audience for web content. The introduction and acceptance to the mainstream of alternatives to Flash technology, such as HTML5, means it is far easier for developers to create content with native support in web browsers, better performance, and a lack of reliance on third-party plugins. Army distributed learning products can take advantage of HTML5 technologies in future-facing endeavors, but the Flash Player will still be a requirement on Army systems to support legacy distributed learning products and provide fallback capabilities when necessary. However, the availability of refined continuously improving technology such as HTML5 means a migration from technologies such as Flash for Army distributed learning products in the future poses little issue. The result will be a distributed learning library capable of playback on a multitude of platforms, with optimal performance, security, and flexibility.