# Adobe Flash End of Life: Flash Will be Phased Out of Major Internet Browsers in January 2021

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**Adobe Flash discontinuation**

Three years ago, in Fall 2017, Adobe announced it would discontinue Flash completely after December 2020. The discontinuation date is now upon us.

**What is Flash**

Flash was an early and dominant software for creating interactive web content. It used static files (.swf files). These were created using Flash Studio software, which was licensed software that someone who wanted to create Flash web-sites could purchase and use to make the .swf files. The learning curve for Flash was not so steep as for many pro-gramming languages. Because Flash used .swf files that ran in browser or on the browser side computer rather than on the web server, the files could be uploaded to cheaper hosting plans and didn't require special server prep or functional-ity. For people looking at the web and visiting websites, they could download a Flash player for their web browser; Flash sites would then run in the browser. With Flash, things like sound effects, interactive content, and games were relatively easy for people making websites to create and post and for users browsing the web to use.

**Historic significance of Flash: A dominant technology for designing and running a website from 2000 to beyond 2010**

Flash was introduced in 1996 by Macromedia Corporation. At the time, HTML was fairly simple and didn't include interactive features. Essentially, using plain old HTML, it was possible to position and color text on a page, to position images, and to link out from text or images to other web pages. Within HTML, it wasn't possible to add sound effects; mouse over animations, accordion out descriptions or text, or provide just about any interactive feature beyond linking to a separate page or file. Flash provided a user friendly way to produce more interactive and visual web pages and was heavily used for web development of interactive pages. Gradually, HTML and CSS added functionality to do more visual and interactive features, and Flash was no longer the only way for a person to easily make interactive web content. Some of the functionality now included in HTML 5 and current open web standards was likely inspired by Flash. In 2010, Steve Jobs, head of Apple released an open letter, "Thoughts on Flash," which announced that Flash would not be allowed on iPhones or iPads and would be discouraged within the Macintosh operating system. This went beyond not supporting the software, which might include extra steps for a user to install software or extra work to find instructions on it. In the closed environment of the Apple App Store, software had to be specifically approved and allowed by Apple in order for someone to run it on an iPhone. This cut off a large chunk of internet users from Flash content and led to Adobe moving resources from Flash toward software packages for app development. Desire to reach iPhone users led to websites choosing other technologies instead of Flash, and web development in Flash dropped off sharply after the Thoughts on Flash open letter. Nevertheless, for a period of more than 10 years from the late 1990s through and beyond 2010, and during a time when regular people first got widespread access to the internet in the U.S., Flash was a dominant software for entire websites to run on. For early web video and simple online games, Flash was almost universally used up until the Thoughts on Flash open letter.

**Discontinuation of Flash**

In July 2017, Adobe announced it would discontinue support and distribution for Flash at the end of 2020. Adobe Inc., Flash & the Future of Interactive Content (July 25, 2017), available at https://blog.adobe.com/en/publish/2017/07/25/adobe-flash-update.html. So, beginning January 2021, Flash player would no longer be available for download from Adobe, and no security or other updates would be made. Something unusual about this discontinuation is that there was coordination between leading web browsers, leading search engines, and the software manufacturer, such that Flash content has been suppressed leading up to the discontinuation date. Adobe's information page about Flash end of

life notes that the Flash end of life announcement was collaboratively written between Adobe and several other technology companies including Apple, Facebook, Google, Microsoft, and Mozilla. Adobe Inc., Adobe Flash Player EOL General Information Page, available at https://www.adobe.com/products/flashplayer/end-of-life.html (last visited Nov. 23, 2020). Essentially, the major web browsers and tech companies will phase out Flash simultaneously. Simultaneous to Adobe's announcement about end of life for Flash, Microsoft posted an announcement regarding its phase out plan for Flash, stating, "By the end of 2020, we will remove the ability to run Adobe Flash in Microsoft Edge and Internet Explorer across all supported versions of Microsoft Windows. Users will no longer have any ability to enable or run Flash." The Microsoft Edge Team, The End of an Era – Next Steps for Adobe Flash (July 25, 2017), available at https://blogs.windows.com/msedgedev/2017/07/25/flash-on-windows-timeline/. Microsoft announced a plan to remove the ability to play Flash files as part of routine updates that install automatically from time to time on people's computers. Microsoft recently reaffirmed this; in September 2020, they released a statement that: "In keeping with this plan, Microsoft is ending support for Adobe Flash Player on Microsoft Edge (both the new Microsoft Edge and Microsoft Edge Legacy) and Internet Explorer 11 at the end of 2020," and "In Summer of 2021, all the APIs, group policies, and user interfaces that specifically govern the behavior of Adobe Flash Player will be removed from Microsoft Edge (legacy) and Internet Explorer 11 via the latest 'Cumulative Update' on Windows 10 platforms and via 'Cumulative Update for Internet Explorer 11' or 'Monthly Rollup' on Windows 8.1, Windows Server 2012 and Windows Embedded 8 Standard. Also, the 'Update for Removal of Adobe Flash Player' will be included as part of the 'Cumulative Update' and 'Monthly Rollup' from this point forward." Microsoft, Update on Adobe Flash Player End of Support (Sept. 4, 2020), available at https://blogs.windows.com/msedgedev/2020/09/04/update-adobe-flash-end-support/. In October 2020, Windows released a voluntary software update (you have to find it and choose to install it; it won't automatically install) to test run removal of Flash from Windows, the Edge browser, and the Internet Explorer browser. Microsoft, Update for the removal of Adobe Flash Player: October 27, 2020 (Oct. 27, 2020), available at https://support.microsoft.com/en-us/help/4577586/update-for-removal-of-adobe-flash-player. Likewise, Google disabled Flash in the Chrome browser and suppressed Flash files from search results in late 2019. Google Search Central, Goodbye, Flash (Oct. 28, 2019), available at https://developers.google.com/search/blog/2019/10/goodbye-flash. And Firefox will remove Flash support in December 2020. Mozilla Developers Network, Plugin Roadmap for Firefox, available at https://developer.mozilla.org/en-US/docs/Plugins/Roadmap (last viewed Nov. 23, 2020).

The discontinuation is more abrupt than usual for software end of life. Usually, software remains in use for a few years after end of life, and it eventually becomes untenable when security issues require that the computer the software is running on be updated in a way that is incompatible with the software. Usually, the date in the end of life announcement is the beginning of the end. With Adobe Flash, it's the end of the end. Software generally either runs fully within a desktop environment (for example older versions of Microsoft Word), and a person can run it until an operating system update interferes with it working, or runs on a web server (for example, older versions of Wordpress), and a person can run it until an update to the server technologies, usually necessitated by internet-wide security concerns, interferes with the software working. Because of files playing in browser and running on the end of the person browsing the web, Flash is in a unique position where browser security updates will end access to the player promptly after security updates are removed. The nature of Flash Player as a browser add-on means that the player runs in an environment with ongoing security risks. For example, browser saved passwords must be kept secure, and cookies must be kept secure so that they can't be reverse engineered, so browsers tend to be continuously and quickly updated, and it's risky for an individual to put off these updates on a browser that they use to login to online accounts. In this case, all major browsers will remove Flash Player promptly after end of life, and because of the connected nature of internet browsing, people have to install browser updates relatively promptly.

Since individual .swf Flash files are available from a wide variety of websites, following December 2020, Flash content likely will still be available, but it will become much more difficult to play or run that content. And because software updates tend to install automatically on an ongoing basis, the change will likely happen in the background soon after the close of December 2020 without people consciously choosing to uninstall Flash players.

This affects a huge amount of back content designed for the web and older websites. To give a sense of the scale and penetration of Flash, I will use Florida's Orange Grove learning objects repository as an example. The Florida Orange Grove was a repository of learning objects for K-20 Florida public education which launched sometime around 2003

and which accepted new content up until 2020. Learning objects were given peer review before being added to the repository and included textbooks, quizzes, and interactive tutorials. In July 2020, Florida's governor vetoed the budget for Florida's state established consortium for distance learning and library technology, which housed the Orange Grove. Shortly after that, several services, including the Orange Grove, were discontinued on 30 days notice. I had worked at the consortium for the previous 5 years but was no longer employed there, and so, from the outside, I did web scraping on discontinued repositories owned collectively and not owned by any single institution. Because of this, I have a comprehensive copy of all content uploaded to the Orange Grove. Out of items uploaded to the learning repository at the time of decommissioning, about 10% were in the .swf Flash format. To give some context, about one third of items uploaded were in the PDF format. So, Flash materials in this long running repository were about 1/3 as prevalent as PDF, and no one doubts the centrality of PDF as a file format.[1] Flash also dominated interactive objects in the repository, as opposed to static content like textbooks and self help tutorials with limited interactivity. That's the scale of existing web materials that will become inaccessible without ability to run Flash.

In a sense, the Flash material skews older. And, in a sense, websites have had a longish window of time to go through Flash content and redo material in a different format if the content was worth the effort. Adobe made the end of life announcement in July 2017 for a December 2020 end of life. That's a big window. But also, interactive content requires a deep dive to understand what it's doing. It's a more difficult conversion than would be text to Microsoft Word to Adobe PDF. And the effort to get interactive content into a modern format is further complicated because a less steep learning curve led to widespread adoption, so effort to redo interactive material in something other than Flash might require more technical skill and a steeper learning curve than did creating the original content. It might take more effort to recreate a Flash website or game in modern dominant technologies than it did to build the original in Flash. Likely, there is significant content that hasn't been moved to new formats and won't be due to limited resources.

**Possible impact of lost content: Videos likely will persist in other formats; interactive content likely will disappear**

Historical or legacy systems sometimes really can be left in the past, but sometimes get set up and used for years. The nature of what will disappear can be understood by understanding that Flash was designed for interactive content and was easier to learn than, for example, a programming language. For a website with video animations in Flash and other similar video oriented content, it's possible to record that to a video format and keep access. The effort to record a Flash video to a video format, for example, an mp4, is relatively modest and can be done with screencasting software in a pinch. For interactive content like an online quiz module, a graphing calculator simulator, a legal forms prep package, or something where clicking on different parts of a picture makes sound effects, it's much more labor intensive to fully recreate that in a format other than Flash, and recreating it requires looking closely at the Flash file then rebuilding in a different format. Beyond public facing websites, there probably will be some impact from internal workflows based on Flash. For example, something built internally within a business that takes a spreadsheet of input and makes load packages for a billing system at a government agency. Another example would be something that takes input and makes a batch file to feed into another system. These are the kinds of things that get set up and left in place until they break. Because Flash was once nearly ubiquitous, and easy to use compared to computer programming alternatives, it's likely that various workflows within businesses and organizations will be affected and have to be redone once operating system updates cut Flash off entirely.

**Flash emulation and access to older content**

Meanwhile, for entertainment content and Flash materials that were created for public use rather than to support internal workflows, Internet Archive recently launched the Flash Software Library at https://archive.org/details/softwarelibrary_flash. The Internet Archive maintains similar software libraries that allow the public to emulate and run games for now-obsolete computer operating systems.

Endnote

1. Many of the items uploaded to the Orange Grove were entire web pages. For this analysis, I've treated an entire web page as a single item. When the web page appeared to have significant content included in the swf Flash format, I treated that as a Flash file. For example, a set of HTML wrappers which call and display Flash files to a browser would be one item, even though it might be many individual files, and here would be counted as a single Flash item, because the "meat" of the website was a series of Flash files with interactive content.