

UNITED STATES COPYRIGHT OFFICE



Long Comment Regarding a Proposed Exemption Under 17 U.S.C. § 1201

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ITEM A. COMMENTER INFORMATION

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The Software Preservation Network coordinates software preservation efforts to ensure long term access to software. It connects and engages the legal, public policy, social science, natural science, information & communication technology and cultural heritage preservation communities that create and use software.

The Library Copyright Alliance consists of three major library associations in the United States: the American Library Association, the Association of College and Research Libraries, and the Association of Research Libraries. These associations represent over 100,000 libraries in the United States employing more than 350,000 librarians and other personnel. An estimated 200 million Americans use these libraries over two billion times each year. These libraries spend over \$4 billion annually acquiring books and other copyrighted material.

ITEM B. PROPOSED CLASS ADDRESSED

Class 9 – Computer Programs — Software Preservation

¹ Primary contact. The Cyberlaw Clinic, Software Preservation Network, and the Library Copyright Alliance thank students Evelyn Chang, Anderson Grossman, and Jillian Goodman for their work in the research and drafting of this comment.

A proposed exemption for libraries, archives, museums, and other cultural heritage institutions to circumvent technological protection measures on lawfully acquired computer programs for the purposes of preserving computer programs and computer program-dependent materials.

ITEM C. OVERVIEW

Famed author George R.R. Martin has a “secret weapon” in the fight to write his *A Song of Ice and Fire* novels (which serve as the basis for the famous HBO series “*Game of Thrones*”) —an old DOS computer that runs the classic word processor, WordStar 4.0, which he uses to write all of his rough drafts.² Perhaps, someday, Martin’s WordStar files will become part of Texas A&M’s George R.R. Martin collection, so scholars can study the original drafts in the format and program in which they were first written. However, future scholars of Martin may find it harder than one might anticipate to view his files. Even if copies of Wordstar continue to exist, and even if a copy is available and run at an archival institution, it will only be accessible because of the heroic efforts of digital preservationists.

Just as Martin’s dragons of Westeros have become the stuff of legend, software and materials that depend on software are disappearing. Today’s digital preservation experts are unduly constrained by Section 1201 in the race against digital disappearance.

Traditionally-analog materials—such as literary manuscripts, data repositories, and diagrams—are now more commonly stored as digital files, transcribed from their original physical formats to protect content from the inevitable degradation of any physical storage.³ Alternatively, they may be created as digital files—“born-digital”—due to our increased dependency on software programs. In response, a significant number of archival institutions, libraries, and museums have created special collections dedicated solely to the preservation of these digital materials.⁴

As software becomes the medium of production for more and more of our works, creative and mundane, there has also been an increased drive to preserve software programs themselves. University libraries and research institutions began developing further-specialized digital archives, such as the National Software Reference Library at the National Institute of Standards

² Lily Hay Newman, *George R.R. Martin Writes on a DOS-Based Word Processor From the 1980s*, SLATE: FUTURE TENSE (May 14, 2014)

http://www.slate.com/blogs/future_tense/2014/05/14/george_r_r_martin_writes_on_dos_based_wordstar_4_0_software_from_the_1980s.html, archived at <https://perma.cc/BW68-J244>. Software scholar Matthew Kirschenbaum writes about Martin’s use of Wordstar as part of his exploration of media archeology of software. Matthew Kirschenbaum, *Case Study #4 | “It Is Known”: George R. R. Martin, WordStar, and Media Archaeology in the Media*, UNIVERSITY OF MINNESOTA PRESS BLOG (May 28, 2014) <http://www.umnpressblog.com/2014/05/case-study-4-it-is-known-george-r-r.html>, archived at <https://perma.cc/PF8K-LF4F>.

³ Jeff Rothenberg, *Ensuring the Longevity of Digital Information*, 26 INT’L J. OF LEGAL INFO. 1, 2 (1998).

⁴ See, e.g., HARVARD COLLEGE LIBRARY COLLECTIONS DIGITIZATION PROGRAM, http://hcl.harvard.edu/collections/digital_collections/digitization_program.cfm, archived at <https://perma.cc/9BBZ-P9WV>. Universities have also invested in shared digital preservation infrastructure like the Academic Preservation Trust, <http://aptrust.org/>, and the Digital Preservation Network, <http://dpn.org/>.

and Technology⁵ and the Olive Archive Project at Carnegie Mellon University,⁶ to maintain access to many software titles that transition out of commercial availability. Not only a means of documenting an important aspect of our modern culture, software preservation also enables future “researchers to understand how software worked, the intentions of software designers, and the affordances and experiences offered to software users,”⁷ topics crucial to the study of software history and the development of future software.

Existing legal alternatives, such as seeking licenses or permissions from rightsholders, have proved insufficient to tackle the substantial problems of preserving software and software dependent materials. Many software titles are orphan works, with the owners lost to time or the rights untraceable. And, even for those that are not, there is often no longer a market for old software (meaning that rightsholders have little incentive to license). The needs of digital preservationists run counter to the modern software trend of new products, versions, and features but are still inhibited by the DMCA’s prohibitions on circumvention.

In both 2003⁸ and 2006,⁹ the Copyright Office and the Librarian of Congress recognized the need to preserve computer programs and granted a § 1201 exemption for the circumvention of technological protection measures (TPMs) in hardware for archival preservation of computer programs. This exemption eased the transfer of data from physical storage to digital storage, and allowed many archives to extract information and software programs that may otherwise have been trapped in outdated hardware. However, obtaining this data and accessing this data are very different procedures. In order to open a lot of these digital files or run the ported software programs, archives need to use other software—much of which is outdated, no longer commercially available, or no longer licensable.¹⁰ As a result, the only way for archives to access the preserved materials is to circumvent the access controls on these outdated software titles.

The exemption that SPN and the LCA seek is a continuation of the digital preservation effort that the Copyright Office and the Librarian had recognized in 2003 and 2006, and the Library of Congress has continued to promote.¹¹ The Software Preservation Network and multiple archival institutions have recognized that the value of software preservation is not in the mere storage of digital information, but in providing this repository of digital information in a usable format to researchers, scholars, and government agencies.¹² In order to allow archives to read the digital

⁵ *National Software Reference Library (NSRL)*, NIST SOFTWARE AND SYSTEMS DIVISION, <https://www.nist.gov/software-quality-group/national-software-reference-library-nsrl>, archived at <https://perma.cc/QB2G-SPUK>.

⁶ *Olive Executable Archive*, <https://olivearchive.org/>, archived at <https://perma.cc/69AF-JT2H>.

⁷ Henry Lowood, *The Lures of Software Preservation*, PRESERVING.EXE: TOWARD A NATIONAL STRATEGY FOR SOFTWARE PRESERVATION 11, available at http://www.digitalpreservation.gov/multimedia/documents/PreservingEXE_report_final101813.pdf.

⁸ Exemption to prohibition against circumvention, 37 C.F.R. § 201.40 (2003).

⁹ Exemption to prohibition against circumvention, 37 C.F.R. § 201.40 (2006).

¹⁰ See, e.g., Survey response by Elena Colon-Marrero, Computer History Museum (describing the programs “Bake and Taste” and “#7010 Dithertizer II Driver software” as outdated and no longer commercially available).

¹¹ *Why Digital Preservation is Important for Everyone*, LIBR. CONG., <http://digitalpreservation.gov/multimedia/videos/digipres.html>.

¹² Trevor Owens, *Life-Saving: The National Software Reference Library*, THE SIGNAL (May 4, 2012), <http://blogs.loc.gov/thesignal/2012/05/life-saving-the-national-software-reference-library/>, archived at <https://perma.cc/P2HP-ZYK9>.

information, as well as to preserve software for the future, we require the Librarian’s permission to circumvent the TPMs in the many software titles that are needed to access digital material.

To aid the Copyright Office’s understanding of the proposed exemption, this comment will: (1) define the scope of the proposed exemption and provide a look at the types of TPMs that we are looking to circumvent; (2) identify the many adverse effects of prohibiting circumvention; (3) discuss how the uses proposed under the exemption are non-infringing; and finally, (4) detail how the proposed exemption aligns with the statutory factors laid out in § 1201.

(1) Defining “computer program” and “computer program-dependent materials”

For the proposed exemption, “computer program” will refer to any device program or application that: (1) allows a user to interact with a device, (2) allows other programs or applications to complete instructed tasks, and/or (3) otherwise allows the device to function. “Computer program” includes but is not limited to: Internet browsers, operating systems, word processors, video games, device drivers, spreadsheets, database viewers, media players, etc.¹³ As software is the term more common in the literature, but computer program is defined in the statute, we use the term “software” interchangeably with “computer program” throughout this comment.

Our proposed exemption also refers to “computer program-dependent materials,” meaning all digital file formats where accessibility depends on a software program. We seek to allow libraries, archives, and other heritage institutions to access and preserve any digital material that they collect—writings, calculations, software programs, etc. The ability to read and preserve a significant portion of this digital material is dependent upon the often-outdated software programs used to create it, which includes system software.¹⁴

These proposed definitions recognize that the problems of software preservation are broad. For many archival institutions, one of the biggest problems with digital collections is the incredible speed at which software is produced and becomes obsolete.¹⁵ Digital files are often proprietary, tailored for very specific software programs and are inaccessible via other programs. While some formats, such as PDF files, for example, are versatile—readable via Adobe Acrobat, Apple Preview, or Google Chrome—many types of older file formats or specialized file formats lack this versatility and cannot be converted accurately into a more universal file format.¹⁶ As a result,

¹³ See Matthew Kirschenbaum, *Software – It’s a Thing*, MEDIUM (Jul. 24, 2014), <https://medium.com/@mkirschenbaum/software-its-a-thing-a550448d0ed3>, archived at <https://perma.cc/YF4X-EL5J> (“Software is thus best understood as a dynamic artifact: not some abstract ephemeral essence, not even just as lines of written instructions or code, but as something that builds up layers of tangible history through the years, something that contains stories and sub-plots and dramatis personae.”).

¹⁴ *Id.*

¹⁵ See, e.g., Jennifer Baker, *Technology moving too fast for governments to keep up, says former Darpa chief*, COMPUTERWEEKLY (Apr. 28, 2016), <http://www.computerweekly.com/news/450294526/Technology-moving-too-fast-for-governments-to-keep-up-says-former-Darpa-chief>, archived at <https://perma.cc/YNG9-ZJDG>.

¹⁶ See, e.g., Allan Hoffman, *Computer Users May Learn They Cannot Access “Old” Documents*, NJ.COM (Apr. 25, 2014), http://www.nj.com/business/index.ssf/2014/04/computer_users_may_learn_they_cant_access_old_documents.html, archived at <https://perma.cc/S5NP-43HE>; see also Jeff Rothenberg, *Avoiding technological quicksand: finding a viable technical foundation for digital preservation*, COUNCIL ON LIBRARY AND INFORMATION RESOURCES, 8 available at <https://www.clir.org/wp-content/uploads/sites/6/pub77.pdf>.

when the original software program is no longer available, many dependent data files are also no longer accessible.¹⁷ For archives and libraries looking to preserve the data in these specialized file formats, it is imperative that they also have a working copy not only of the software program used to create the files but also the system software needed to run the program.¹⁸

ITEM D. TECHNOLOGICAL PROTECTION MEASURE(S) AND METHOD(S) OF CIRCUMVENTION

The technological protection measures that inhibit access to computer software are varied. They include but are not limited to:

1. *Product Keys*. Product keys are “unique, alpha-numeric code[s]” that are required to be entered upon installation of computer software.¹⁹ Keys may be attached either to individual copies of software, or be randomly generated and required to be validated by the user’s computer connecting to the Internet. Product keys may also be called serial keys or license keys.
2. *Passwords*. Proprietary software developed for specialized uses may be password-protected. Users can be required to input a password either upon installation or execution, or to access data.²⁰
3. *Online Authentication*. Software may require the user’s hardware to be connected to the Internet while using the software.²¹ Online authentication can take place at any point during software runtime or execution. One form of authentication stores a portion of the software’s code online.²² If the software is not connected to the Internet and authenticated, the missing portion of code will render it useless.²³
4. *Bad Sector Copy Protection*. Software protects against copying by rendering some portions of the storage media unreadable when copied.²⁴
5. *Time Restrictions*. Software may only run for limited time without an active subscription. When support is pulled for the software, it is inaccessible without reverting the system time.²⁵

¹⁷ *Id.* This problem is not new, see Claire Tristram, *Data Extinction*, MIT TECH. REV. (Oct. 1, 2002), <https://www.technologyreview.com/s/401682/data-extinction/>, archived at <https://perma.cc/B7ZX-VPU7>.

¹⁸ Trudy Peterson, *Archival Principles and Records of the New Technology*, 47 AM. ARCHIVIST 383, 386 (1984) (“A software-dependent file will print out as gibberish unless it is processed on a computer that has the right software.”).

¹⁹ Tim Fisher, *What is a Product Key*, LIFEWIRE (May 21, 2017), <https://www.lifewire.com/what-is-a-product-key-2625952>, archived at <https://perma.cc/2PYV-B6KT>.

²⁰ Survey Response by Vitorio Milano.

²¹ Survey Response by Christopher DeLaurenti, College of William and Mary.

²² Ian R. Kerr et al., *Technical Protection Measures: Tilting at Copyright’s Windmill*, 34 OTTAWA L. REV. 6, 19 (2002–2003).

²³ *Id.*

²⁴ Philip Elmer-DeWitt & Scott Brown, *Computers: A Victory for the Pirates?*, TIME, Oct. 20, 1986, at 86.

²⁵ Survey Response by Andrew Berger, Computer History Museum.

6. *CD-Checks*. Software will only install or run when it detects that the CD is in the computer. Similar checks are sometimes implemented in other media storage formats.²⁶
7. *Dongles*. Dongles are a form of hardware, such as a USB stick, that must be inserted into the computer to run software.²⁷

ITEM E. ASSERTED ADVERSE EFFECTS ON NONINFRINGEMENT USES

(1) Adverse Effects of Prohibiting Circumvention on Software Preservation

Absent an exemption, significant amounts of software and software-dependent materials could be lost forever. Jeff Rothenberg, in his seminal article originally published in *Scientific American*, details how much has already been lost:

[Possible loss includes] hundreds of reels of tape from the Department of Health and Human Services; files from the National Commission on Marijuana and Drug Abuse, the Public Land Law Review Commission, the President's Commission on School Finance, and the National Commission on Consumer Finance; the Combat Area Casualty file containing POW and MIA information for the Vietnam war; herbicide information needed to analyze the impact of Agent Orange; and many others.²⁸

The problem is not limited to tapes. Obsolescence is common in physical storage media in as few as five years.²⁹ TPMs prevent the migration of software and software-dependent material from fragile forms of media to systems designed for preservation.³⁰ Without preservation efforts, there is no guarantee that tomorrow's software and hardware will recognize, run, and read today's digital files, let alone digital files from twenty years ago.³¹ Increases in the use of cloud-computation further removes software from physical form—orphan cloud-based software may not exist on users' hard drives to be eventually recovered.³² The number of dependencies required to interpret digital data create significant preservation challenges, and increase the risk of data loss. Data migration and emulation both require modification of the original software to allow for installation on current hardware.³³

²⁶ Survey Response by Luke Menzies, Indiana University.

²⁷ Survey Response by Christopher DeLaurenti, College of William and Mary. As discussed above, dongle-based authentication mechanisms were covered by exemptions granted in the 2003 and 2006 cycles.

²⁸ Jeff Rothenberg, *Ensuring the Longevity of Digital Information*, 26 INT'L J. OF LEGAL INFO. 1, 2 (1998)

²⁹ *Id.* at 3.

³⁰ Letter from Henry Lowood, Curator, Stanford Univ. Libraries, to Harvard Law Sch. Cyberlaw Clinic (Nov. 24, 2017).

³¹ Ian Sample, *Google boss warns of 'forgotten century' with email and photos at risk*, The GUARDIAN (Feb. 13, 2015), <https://www.theguardian.com/technology/2015/feb/13/google-boss-warns-forgotten-century-email-photos-vint-cerf>, archived at <https://perma.cc/Z89D-47T4>.

³² *Id.*

³³ Letter from Henry Lowood, *supra* note 31.

The vast majority of information generated is born-digital, and preservationists need to work diligently to preserve and provide access to it.³⁴ Material that appears mundane now will likely have immense historical and archaeological value in the future.³⁵ Even today's emails will eventually be an important historical record if the software exists to read them.³⁶ Without an exemption, archival efforts are stalled, and data is left stored in forms more vulnerable to degradation.³⁷

Many software programs that are, from an archivist's point of view, recent history have already been orphaned.³⁸ Software, in itself, has important research value. Software can serve as and is analyzed by scholars as a historical and current expression of daily life. For many working people, software is a tool used daily—more so than many ancient tools dug up in archaeological sites. Many scholars study software to understand how the design of the tool affects the design of the work – and what those tools say about the place of the worker in society.³⁹ How we encode and statisticize our life in software affects our digitally-independent actions.⁴⁰ Some software, such as PowerPoint, is studied for how its ubiquity in public performance has shaped how information is distributed and processed.⁴¹ Historical software study is made much more difficult on TPM-protected software without circumvention.

If museums, libraries, and archives cannot circumvent the TPMs on software donated to them, they will be unable to preserve the software-dependent material that is often part of the donation. This software-dependent material could include an artist's born-digital works or an architectural firm's first-draft designs, or more traditional written documents like a novel's first draft. And using modern software that claims backwards compatibility does not always work. Digital work

³⁴ Prabin B. Dhakal & Kabita Paudyal, *News Media initiative to developing digital repository from public contribution: A case of SDPL Nepal*, INT'L FED'N LIBR. ASS'N INSTITUTIONS (Jan. 8, 2016) at 2, available at <http://library.ifla.org/1503/1/090-dhakal-en.pdf>.

³⁵ Simon Sharwood, *Digging code: Software archaeology*, TECHREPUBLIC (Nov 2, 2004), <https://www.techrepublic.com/article/digging-code-software-archaeology/>, archived at <https://perma.cc/G5AV-JY8J> (examines commercial value to “digging” through old code); *Perspectives on the Value of Software Preservation*, LIBR. CONGRESS, http://www.digitalpreservation.gov/meetings/documents/preservingsoftware2013/Presoft_Pres-Owens.pdf (last visited Dec. 1, 2017) (software has historical value as a human tool).

³⁶ *Preserving Email Messages of Enduring Value*, U. ILL., https://www.uillinois.edu/cio/services/rims/about_rims/projects/preserving_email_messages_of_enduring_value/ (last visited Dec 2. 2017) (follow hyperlink; then follow “Preserving Email Project Plan” hyperlink) (describing program to preserve emails in part due to the University's diminishing historical record); see also MELLON EMAIL ARCHIVES TASK FORCE, <http://www.emailarchivestaskforce.org/>, archived at <https://perma.cc/2AE6-7PFW>.

³⁷ Letter from Henry Lowood, *supra* note 31.

³⁸ See e.g., Jake Widman, *Great Lost Software: 16 Gone But Not Forgotten*, INFORMATIONWEEK (Feb. 22, 2011) https://www.informationweek.com/great-lost-software-16-gone-but-not-forgotten/d/d-id/1096238?page_number=1, archived at <https://perma.cc/C6XH-JJUB>; see also Dan Bricklin, *Copy Protection Robs The Future*, <http://www.bricklin.com/robfuture.htm>, archived at <https://perma.cc/2DYV-CXKN> (discussing specific example of almost orphaned software VisiCalc).

³⁹ See Matthew Fuller, *It looks like you're writing a letter: Microsoft Word*, NETTIME (Sep. 5, 2000), <http://www.nettime.org/Lists-Archives/nettime-l-0009/msg00040.html>, archived at <https://perma.cc/9NE3-UKZ4>.

⁴⁰ See Paul Dorish, *No SQL: The Shifting Materialities of Database Technology*, COMPUTATIONAL CULTURE (Nov. 9, 2014), <http://computationalculture.net/no-sql-the-shifting-materialities-of-database-technology/>, archived at <https://perma.cc/4TJK-YSC9>.

⁴¹ See Erica Robles-Anderson and Patrik Svensson, “One Damn Slide After Another”: PowerPoint at Every Occasion for Speech, COMPUTATIONAL CULTURE (Jan 15. 2016), <http://computationalculture.net/one-damn-slide-after-another-powerpoint-at-every-occasion-for-speech/>, archived at <https://perma.cc/24XQ-TA84>.

loaded by backwards-compatible software, if it exists, can distort the original material. Backwards compatibility sometimes relies on converting the original data into a contemporary file format; this can cause data loss or be impossible without access to the original software.⁴² Architectural designs may be rendered without objects no longer supported by current versions. Music and visual art may be missing key components that were supported by community-created plugins that are not compatible with current software.

Scholars, archivists, and preservationists are currently seeing their efforts rebuffed by TPMs. For example, The Rhizome Net Art Anthology is unable to run Internet Explorer 6, the browser that “ruled the web for the first years of the century,” without circumventing software activation.⁴³ Other art is similarly impacted. The Philadelphia Museum of Art is unable to preserve a time-based media artwork because of TPMs blocking Adobe Flash.⁴⁴ Preserving art in its original form is fundamental to protecting artistic integrity, but without Flash, the lighting and projection components of the piece are lost.⁴⁵ The Electronic Literature Organization, which preserves electronic literature formats such as Hypercard and Storyspace, cannot save significant portions of its collection due to proprietary but obsolete software.⁴⁶

Other software is completely inaccessible. For example, some of the Computer History Museum’s donated software is time-locked – only accessible by manipulating the system clock.⁴⁷ Unless the Computer History Museum is able to circumvent this TPM, they will not be able to engage in the non-infringing use of modifying their lawfully-acquired copy of the program in order to run it on their computers. In addition, the museum also has difficulties with Windows XP, software that has a license key and must be activated after installation.⁴⁸ Again, an exception is required for the museum to be able to circumvent this license key so they can adapt the software in order to enable its internal use. Without a circumvention of the TPM, the museum’s copy of the Windows XP software would be rendered unusable, and so will any software that requires XP to function.

Other software is stored on floppy-disks with copy protection, rendering it unusable in emulators without circumventing TPMs.⁴⁹ Researchers may be unable to preserve entire collections of work from Apple because they would require circumvention.⁵⁰ This is further complicated by the fragile nature of the original media. The Living Computers: Museum + Labs cannot put some of their software collection on display because the original floppy disks are easy to break.⁵¹ And without circumvention, they cannot make copies.⁵²

⁴² Survey Response by Christopher DeLaurenti, College of William and Mary.

⁴³ Survey Response by Dragen Epenschied, Rhizome.

⁴⁴ Survey Response by Elise Tanner, Philadelphia Museum of Art.

⁴⁵ *Id.*

⁴⁶ Survey Response by Dene Grigar, Electronic Literature Organization.

⁴⁷ Survey Response by Andrew Berger, Computer History Museum.

⁴⁸ *Id.*

⁴⁹ Survey Response by Andrew Berger, Computer History Museum.

⁵⁰ Survey Response by Elena Colon-Marrero, Computer History Museum.

⁵¹ Survey Response by Cynde Moya, Living Computers: Museum + Labs; Survey Response by Heath Reinhard, Living Computers: Museum.

⁵² Letter from Henry Lowood, *supra* note 31.

Even receiving and cataloging software-dependent material poses a challenge. Even when the software necessary to read the files is included in the donation and fair use permits its use, TPMs can prevent discovering the nature and importance of software-dependent material. Archivists may not even be able to read a file, preventing them from determining its relevance or cataloging it correctly.

Libraries and archives efforts are stifled by legal risk, and asking copyright holders for permission is not a sustainable alternative.⁵³ Even when the copyright owner is known, different components of a single piece of software can be owned by different parties. For example, preservationists ran into problems when they realized that *The Crossing*, a Pulitzer-prize winning web series, used a font owned by a different copyright holder. It took four years of negotiation to get permission to resurrect the original work, and then additional negotiation to use the font from the font copyright holder to display the work as it was originally envisioned.⁵⁴

When the copyright holder is not known, problems securing the legal rights to circumvent TPMs can be insurmountable. Stanford University Libraries attempted to contact the 934 publishers of twelve to fifteen thousand software items they received in the Cabrinety collection of pre-1995 software, with limited success.⁵⁵ And if the copyright owners cannot be found, and the software is protected by TPMs, absent an exception, both the files and the software may be lost forever.

(2) Non-infringing Uses

The activities covered by our exemption are non-infringing, as required by 17 U.S.C. § 1201(a)(1)(C). The digital preservation efforts by cultural heritage institutions are covered by the fair use doctrine, and some cases may fall under 17 U.S.C. § 108 and 17 U.S.C. § 117.

(A) Fair Use

Originally judicial doctrine, Congress provided statutory guidance for finding fair use according to the following factors:

- (1) the purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes;
- (2) the nature of the copyrighted work;
- (3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and

⁵³ David S. H. Rosenthal, *Emulation & Virtualization as Preservation Strategies*, ANDREW W. MELLON FOUND., 16-17, available at https://mellon.org/media/filer_public/0c/3e/0c3eee7d-4166-4ba6-a767-6b42e6a1c2a7/rosenthal-emulation-2015.pdf.

⁵⁴ *Id.* See also Adrienne LaFrance, *Raiders of the Lost Web*, THE ATLANTIC (Oct. 14, 2015), <https://www.theatlantic.com/technology/archive/2015/10/raiders-of-the-lost-web/409210/>, archived at <https://perma.cc/QB73-SWCS>.

⁵⁵ Rosenthal, *supra* note 54, at 17.

(4) the effect of the use upon the potential market for or value of the copyrighted work.⁵⁶

Although the factors weigh heavily in judicial decision-making, the list is not exhaustive, and no one factor is decisive.⁵⁷ Rather, each factor is to be considered and weighed together, “in light of the purposes of copyright.”⁵⁸

I. Purpose and Character of Use

Copying for preservation and archival use is prototypically fair, as it promotes the “progress of Science and the useful Arts.”⁵⁹ Copyright law was developed to ensure the public enjoys the fruits of our country’s scientific and cultural achievements.⁶⁰ Uses that “benefits the broader public interest” are more likely to be fair,⁶¹ as are non-profit, non-commercial uses.⁶² The archival institutions that would fall within this exemption, like libraries and museums, are usually not-profit and engaged in non-commercial activity.

Preserving public access to information constitutes a public benefit and is strongly favored in the fair use analysis. The legislative history of the Copyright Act makes clear that Congress intended preservation to be fair use: “organizations [that] rescue and preserve this irreplaceable contribution to our cultural life are to be applauded, and the making of duplicate copies for purposes of archival preservation certainly falls within the scope of ‘fair use.’”⁶³ Courts have ruled accordingly. In *Authors Guild, Inc. v. Google Inc.*, for example, the court held that Google Books created a “significant public benefit” by preserving out-of-print books.⁶⁴ Archival institutions create the same valuable public benefit by preserving software. In fact, the benefit of software preservation is two-fold. The public benefits from both the preservation of the software as its own work and the preservation of the information contained in data formats that are, without the preserved software, otherwise inaccessible.

In addition to the public benefit and non-commercial character of a use, courts typically consider as part of the first factor calculus whether a use is “transformative,” i.e., whether it uses copyrighted material “in a different manner or for a different purpose from the original.”⁶⁵ Transformative use is not a prerequisite for a finding of fair use,⁶⁶ nor even for a favorable first

⁵⁶ 17 U.S.C. § 107.

⁵⁷ See *Castle Rock Entm't, Inc. v. Carol Publ'g Grp., Inc.*, 150 F.3d 132, 145 (2d Cir. 1998); see also H.R. REP. NO. 94-1476, at 65 (1976).

⁵⁸ *Campbell v. Acuff-Rose Music, Inc.*, 510 U.S. 569, 578 (1994).

⁵⁹ *Id.* at 575. (quoting U.S. CONST. art. I, § 8, cl. 8.).

⁶⁰ U.S. CONST. art. I, § 8, cl. 8.; see also *Universal City Studios, Inc. v. Sony Corp. of Am.*, 464 U.S. 417, 429 (1984).

⁶¹ *Blanch v. Koons*, 467 F.3d 244, 253 (2d Cir. 2006).

⁶² See *Sony*, 464 U.S. at 451.

⁶³ See H.R. REP. NO. 94-1476, at 73 (1976).

⁶⁴ See *Authors Guild, Inc. v. Google Inc.*, 954 F. Supp. 2d 282, 293 (S.D.N.Y. 2013), *aff'd sub nom. Authors Guild v. Google, Inc.*, 804 F.3d 202 (2d Cir. 2015); see also *Field v. Google Inc.*, 412 F. Supp. 2d 1106, 1118 (D. Nev. 2006) (finding the first factor to favor Google when Google provided “cached” versions of no longer accessible websites); *Sundeman v. Seajay Soc’y, Inc.*, 142 F.3d 194, 203 (4th Cir. 1998) (finding archives’ provision of surrogate copy to researcher to avoid damage to fragile original manuscript “served the ‘public benefit’ and ‘the development of art’” and thus factor one favored fair use).

⁶⁵ Pierre N. Leval, *Toward a Fair Use Standard*, 103 HARV. L. REV. 1105, 1111 (1990).

⁶⁶ *Campbell*, 510 U.S. at 579 (citing classroom distribution as an obvious example of non-transformative fair use).

factor outcome.⁶⁷ Nevertheless, many of the uses contemplated by this exemption are transformative.

Preservation itself serves a different purpose from the original commercial purpose of software—it ensures that the preserved work will be available for research in the future. Just as the search engine in *Authors Guild v. Google* indexes but does not “read” the digitized volumes in the Google Books corpus, the software preservation professional preserves but does not “use” software (except to the limited extent necessary to describe and evaluate the collection). Their use is in this sense “non-consumptive,” and serves the new and socially beneficial purpose of ensuring that the work is protected from harm for the use of future generations.

In making vintage software and software-dependent material accessible for research on contemporary hardware machines, archivists and other software preservation professionals “create a new platform” for use of the software, affording opportunities for software use “in new environments,” where original hardware is not available, activities the Ninth Circuit has found transformative.⁶⁸ Providing research access to a collection of material that originally served a different commercial purpose has also been found transformative.⁶⁹

II. The Nature of the Work

“The law generally recognizes a greater need to disseminate factual works than works of fiction or fantasy.”⁷⁰ Therefore, the “scope of fair use is greater with respect to factual than nonfactual works.”⁷¹ Many TPM-protected software titles are primarily factual works. For instance, the value of word-processing, spreadsheet, and database software comes from their functional ability to represent information that is owned or created by those seeking access. Thus, the second factor supports finding the existence of non-infringing uses.⁷²

Furthermore, functional elements of computer programs are not protected by copyright,⁷³ and copying to gain access to those functional elements are more likely to be fair use.⁷⁴ In the cases covered by this exemption, observing the functionality of older software is necessary to preserve access to software dependent material that would otherwise be unreadable. This is because,

⁶⁷ See, e.g., *Cambridge Univ. Press v. Patton*, 769 F.3d 1232, 1267 (11th Cir. 2014) (finding first factor favored fair use for non-profit copying for educational purposes, even when use was non-transformative).

⁶⁸ *Sony Computer Entertainment, Inc. v. Connectix Corp.*, 203 F.3d 596, 606 (9th Cir. 2000).

⁶⁹ See *White v. West Publ'g Corp.*, 29 F. Supp. 3d 396, 399 (S.D.N.Y. 2014).

⁷⁰ *Harper & Row Publishers, Inc. v. Nation Enters.*, 471 U.S. 539, 563 (1985).

⁷¹ *Am. Geophysical Union v. Texaco Inc.*, 60 F.3d 913, 925 (2d Cir. 1994); see also *Campbell*, 510 U.S. at 586 (collecting cases where lesser protection was extended to factual works).

⁷² *Sega Enters. v. Accolade, Inc.*, 977 F.2d 1510, 1526 (9th Cir. 1992) (finding that computer programs deserve a lesser degree of copyright protection because their unprotected functional elements are not visible without copying); see also *Am. Geophysical Union*, 60 F.3d at 925 (holding that, although copied journal articles contained a significant amount of creativity, because the primary purpose of copying was to access the facts and ideas contained within, the court was “precluded” from finding the articles were “within the core of copyright’s protective purpose”); see also *Television Digest, Inc. v. U.S. Tel. Ass'n*, 841 F. Supp. 5, 10 (D.D.C. 1993) (finding that a trade newsletter’s factual nature favored a finding of fair use for factor two).

⁷³ See *Sony Computer Entm't, Inc. v. Connectix Corp.*, 203 F.3d 596, 603 (9th Cir. 2000) (citing *Sega Enters. v. Accolade, Inc.*, 977 F.2d 1510 (1992)).

⁷⁴ *Id.* at 604-5.

unlike the functional ideas and methods expressed in an accounting textbook, for example, the functional elements of computer programs are not directly visible.⁷⁵

Finally, many computer programs that exemption users may seek to access are “orphaned.” Copyright holders may be bankrupt, dissolved, or dead. Records that could point to the original copyright owner of the software could be inaccessible for the same reasons this exemption is necessary. The Senate Report on the Copyright Act of 1976 recognized that the use of copyrighted material that is “out of print” or otherwise unavailable is likely to fall under fair use.⁷⁶ Scholars⁷⁷ and librarians and archivists⁷⁸ have also argued that fair use should favor broader use of orphan works.

III. The Amount and Substantiality Used

The primary focus of the third factor is whether the extent copied was “reasonable in relation to the purpose”⁷⁹ Notably, courts have concluded that “copying the entirety of a work is sometimes necessary.”⁸⁰ Providing access to vintage software may, in some cases, be impossible without copying the whole work. Emulating only portions of code will not result in functional software. Thus, because the amount exemption users would copy is reasonable in relation to the purpose of the copying, the third factor favors fair use.

IV. The Effect on the Market for the Work

The copyright system is designed “[n]ot primarily for the benefit of the author, but primarily for the benefit of the public.”⁸¹ The temporary monopoly Congress granted to authors serves to “induce release to the public of the products of [the author’s] creative genius.”⁸² To serve the system’s broader purpose, courts “must occasionally subordinate the copyright holder’s interest in a maximum financial return to the greater public interest”⁸³ Creating and maintaining copies for the purpose of archiving and scholarship do not interfere in the market for the work, making the impact on the copyright holders’ interest minimal.

Scholars require access to vintage word processing programs, design software, and the like in order to study them and the materials that depend on them, not for their original commercial purposes (creating text files, 3D designs, and so on). Thus the researcher’s use of archived

⁷⁵ See *Sega Enters.*, 977 F.2d at 1526.

⁷⁶ S. REP. NO. 94-1476, at 64 (1976); see also *Triangle Publ’ns, Inc. v. Knight-Ridder Newspapers, Inc.*, 626 F.2d 1171, 1176 n.14 (5th Cir. 1980).

⁷⁷ See generally Jennifer Urban, *How Fair Use Can Help Solve the Orphan Works Problem*, 27 BERKELEY TECH. L.J. 1379 (2012).

⁷⁸ See generally PATRICIA AUFDERHEIDE ET AL., STATEMENT OF BEST PRACTICES IN FAIR USE OF COLLECTIONS CONTAINING ORPHAN WORKS FOR LIBRARIES, ARCHIVES, AND OTHER MEMORY INSTITUTIONS (2014), available at <http://cmsimpact.org/wp-content/uploads/2016/01/orphanworks-dec14.pdf>.

⁷⁹ See *Campbell v. Acuff-Rose Music, Inc.*, 510 U.S. 569, 586 (1994).

⁸⁰ *Bill Graham Archives v. Dorling Kindersley Ltd.*, 448 F.3d 605, 613 (2d Cir. 2006); see also *Núñez v. Caribbean Int’l News Corp.*, 235 F.3d 18, 24 (1st Cir. 2000) (finding that copying an entire picture was reasonable because copying less would be useless).

⁸¹ H.R. REP. NO. 60-2222, at 2227 (1909).

⁸² *U.S. v. Paramount Pictures*, 334 U.S. 131, 158 (1948).

⁸³ *Williams & Wilkins Co. v. United States*, 487 F.2d 1345, 1352–53 (Ct. Cl. 1973), *aff’d*, 420 U.S. 376 (1975).

software does not “supersede[] the objects’ of the original creation.”⁸⁴ Scholars studying word processing software, for example, may study a wide variety of word processing applications in an archival collection, but they will use their own lawfully-owned or licensed modern word processing software, like Microsoft Word, to prepare their manuscript.

In some cases, the publisher for a work is clear and still in business, even licensing their works. In this circumstance, the mere presence of a licensing market does not obviate fair use. “The goal of copyright is to stimulate the creation of new works, not to furnish copyright holders with control over all markets. Accordingly, the ability to license does not demand a finding against fair use.”⁸⁵

When a publisher has not made software available for license in a particular use, absent other evidence, it can be inferred that the publisher “did not think that there would be enough such use to bother making a license available.”⁸⁶ In such cases, there is “little damage” and this factor should favor fair use.⁸⁷ Because the market that drives the creation of new software is the creation of new functionality and design, not the preservation community, much of the software that this exemption would cover is not available to license. Often the demand for old software is small, and designing a licensing program to capture that market is not worth the cost.⁸⁸ Assuming the owners are identifiable and reachable, copyright to different elements of the same software may be held by different owners—making the licensing agreements necessary for the creation of a market difficult or impossible to obtain.

In other circumstances, the copyright holder is unidentifiable. In these cases, there is no harm to the copyright holder, and usually minimal harm to the market that might exist for similar software. New software is created to satisfy the demand for new features, new design, and new functionality. In contrast, the demands of the preservation community are naturally in the opposite direction of market forces – their goal is to preserve the work as it existed at a point in time. Therefore, their fair use does not interfere with the incentive to create new software—the primary purpose of copyright.⁸⁹

(B) 17 U.S.C. § 108(c) and (h)

There may be other categories of non-infringing use that the copying of software for archival purposes falls into, for example, the statutory exemptions to copyright law for libraries and archival institutions seeking to make limited digital or physical copies of a copyrighted work for preservation purposes.⁹⁰ Of course, the applicability of 17 U.S.C. § 108 does not preclude the applicability of the fair use doctrine.⁹¹

⁸⁴ *Campbell*, 510 U.S. at 579.

⁸⁵ *Cambridge Univ. Press v. Patton*, 769 F.3d 1232, 1276 (11th Cir. 2014).

⁸⁶ *Id.* at 1276–77.

⁸⁷ *Id.*

⁸⁸ *See Authors Guild, Inc. v. HathiTrust*, 755 F.3d 87, 103 (2d Cir. 2014) (finding the book market for the blind too small, or non-existent for some books, to be considered in market harm analysis).

⁸⁹ *See Paramount Pictures*, 334 U.S. at 158.

⁹⁰ 17 U.S.C. § 108.

⁹¹ 17 U.S.C. § 108(f)(4).

The Copyright Office has highlighted two specific provisions—clauses (c) and (h)—and requested commentary on the applicability of each clause to an analysis of copyright non-infringement for this proposed exemption.

I. 17 U.S.C. § 108(h)

17 U.S.C. § 108(h) is usually inapplicable to digital preservation efforts due to the time restriction in the clause—libraries and archives must wait until the last 20 years of the software or digital material’s copyright for this exemption clause to apply. Under the Copyright Act, any work created after January 1, 1978—which includes the majority of modern software—would have a valid copyright for 95 years from first publication of the work, or 70 years after the death of the author (for works not made for hire).⁹²

Libraries and archives cannot wait another 40 years to preserve legacy software from the early 1980s because, by then, there would be nothing left to preserve.⁹³ Like analog materials, software and digital materials degrade over time. In a matter of three to five years, the data stored on a hard drive may be corrupted or otherwise no longer accessible.⁹⁴ Software is also developing and advancing at a breakneck speed, with some companies rendering software products obsolete after two to three years.⁹⁵ In just a few years, some software may no longer even exist and all materials that are dependent on that software would no longer be accessible.⁹⁶ WordStar, the prominent word processing program discussed above, was developed in 1978 and used widely in the 1980s, but is no longer available without an emulator.⁹⁷ If software preservationists had not actively developed emulation programs for WordStar already, and instead, waited for 17 U.S.C. § 108(h) to apply in 2053, not only would the digital files dependent on WordStar be inaccessible for preservation in the meantime and likely subject to data degradation, but the WordStar program itself might have been lost entirely.

II. 17 U.S.C. § 108(c)

Unlike the expansive scope of the fair use doctrine discussed above, non-infringing use under 17 U.S.C. § 108(c) covers only a slim subsection of the many important uses the exemption would

⁹² 17 U.S.C. § 302.

⁹³ Teresa Soleau, *Preventing Digital Decay*, THE IRIS: BEHIND THE SCENES AT THE GETTY (Oct. 20, 2014), <http://blogs.getty.edu/iris/preventing-digital-decay/>, archived at <https://perma.cc/AKV2-9CS5>.

⁹⁴ Simon Hill, *How do you preserve your personal data forever? We ask an expert*, DIGITAL TRENDS (July 12, 2015), <https://www.digitaltrends.com/computing/how-do-you-preserve-digital-data-forever/>, archived at <https://perma.cc/WZ8J-CN5J> (interviewing Dr. Micah Altman of MIT on longevity of data storage).

⁹⁵ Steven J. Vaughan-Nichols, *Windows 10 is making too many PCs obsolete*, COMPUTERWORLD, <https://www.computerworld.com/article/3209977/microsoft-windows/windows-10-is-making-too-many-pcs-obsolete.html>, archived at <https://perma.cc/SCZ6-4CU7>.

⁹⁶ *The 'Bit List' of Digitally Endangered Species*, DIGITAL PRESERVATION COALITION, <http://dpconline.org/our-work/bit-list>, archived at <https://perma.cc/8MYV-AE6M>.

⁹⁷ See Thomas J. Bergin, *The Origins of Word Processing Software for Personal Computers: 1976-1985*, IEEE ANNALS OF THE HISTORY OF COMPUTING, Oct.–Dec. 2006, at 32–47; Matthew Kirschenbaum, *Case Study #4 | "It Is Known": George R. R. Martin, WordStar, and Media Archaeology in the Media*, UNIVERSITY OF MINNESOTA PRESS BLOG (May 28, 2014) <http://www.umnpressblog.com/2014/05/case-study-4-it-is-known-george-r-r.html>, archived at <https://perma.cc/PF8K-LF4F>.

enable. There are four elements that must be met for a use to be non-infringing under 17 U.S.C. § 108(c):

- a) That the library or archival institution is duplicating a work solely for “the purpose of replacement of a copy or phonorecord that is damaged, deteriorating, lost, or stolen, or if the existing format in which the work is stored has become obsolete;
- b) The library or archives has, after a reasonable effort, determined that an unused replacement cannot be obtained at a fair price; and
- c) Any such copy or phonorecord that is reproduced in digital format is not made available to the public in that format outside the premises of the library or archives in lawful possession of such copy.”
- d) That no more than three copies are created.⁹⁸

Congress has further defined a format to be considered “obsolete” if the “machine or device necessary to render perceptible a work stored in that format is no longer manufactured or is no longer reasonably available in the commercial marketplace.”⁹⁹

Some preservation activities fit within the constraints of § 108(c). With respect to the first two elements of 17 U.S.C. § 108(c), the need to create digital copies of files stored in outdated hardware—to migrate digital data—arises precisely because of the obsolete nature of such outdated hardware.¹⁰⁰ For example, computers, laptops, and external disk drives commercially-available nowadays already have no ability to read 8-inch or 5.25-inch floppy disks—the very definition of “obsolete”—and hence, libraries and archives must migrate the data into digital copies to preserve the content on these disks for future access. There are no unused replacements that archives can seek out because floppy disks with the exact same content are no longer manufactured. Similarly, with “born-digital” material that is dependent on outdated software, libraries and archives must create modified, accessible copies precisely because the software used to create and access the material has become obsolete—no longer manufactured or licensable, and consequently, there are also no unused replacements because the software needed to create any replacement files is no longer available.

Some libraries and archives limit the usage of their collection to onsite usage only, ensuring that all copies of the digital materials would remain within the premises of the library or the archive in compliance with the third element listed above. At the Stanford University Libraries, for example, users must request all materials 48 hours prior to their intended viewing time. Users must then go to a physical reading room located in the archives to access the requested materials, regardless of whether the material exists in paper or digital formats.¹⁰¹ In some instances, libraries and archives are able to limit the number of copies of digital material that they possess

⁹⁸ 17 U.S.C. § 108(c)

⁹⁹ 17 U.S.C. § 108(c)(2).

¹⁰⁰ *Chamber of Horrors – Obsolete and Endangered Media*, DIGITAL PRESERVATION MANAGEMENT, <http://www.dpworkshop.org/dpm-eng/oldmedia/disks.html>, archived at <https://perma.cc/TZ2G-G4SL>.

¹⁰¹ *Using our collections*, STANFORD LIBRARIES, <https://library.stanford.edu/spc/using-our-collections>.

to the three stipulated by 17 U.S.C. § 108(c)—having just one copy of a “born-digital” VisiCalc file, for example, to be read by modified software.

Therefore, 17 U.S.C. § 108(c) may be appropriate to exempt from copyright infringement the specific activities where material existing in outdated physical formats are transcribed into three or fewer digital copies, or the rare instances when an archive creates just one modified copy of a “born-digital” file to increase accessibility with modern software tools.

However, as the Copyright Office itself has said, the current language of 17 U.S.C. § 108(c) clearly does not cover a huge portion of digital preservation—for example, (1) any archival activity that requires modifying outdated software or making copies of digital material that may incidentally create more than three temporary copies in the process of preservation, (2) any archival activity that requires the storage of more than three copies of a digital material at any one point in time, or (3) any preservation activities by institutions that are not considered a library or an archive, such as museums.

During the process of modifying software or copying digital materials, procedural mechanisms usually inadvertently create multiple temporary copies¹⁰²—which, while limited in duration, may nevertheless constitute “copies” that violate the three-copy rule in 17 U.S.C. § 108(c) under traditional copyright case law.¹⁰³ The Section 108 Study Group created by the Copyright Office has also identified that “digital preservation requires the making and active management of multiple copies over time, stored in multiple locations, prior to deterioration and the loss of information.”¹⁰⁴ The Copyright Office has discussed amending 17 U.S.C. § 108 for better alignment with preservation in the digital age, first with the creation of the Section 108 Study Group in 2008 and then recently with the release of the Section 108 Discussion Document.¹⁰⁵ This indicates a working desire in Copyright Office to extend 17 U.S.C. § 108 to cover all aspects of digital preservation by libraries, archives, and museums. The Copyright Office’s Discussion Document includes proposed new statutory language, such as amending the three-copy language to allow for the “number of copies reasonably necessary”¹⁰⁶ to create one end-use copy and expanding availability to users off-premise for a limited time to reflect researchers’ practical need to access digitized information from other locations.¹⁰⁷ Additionally, proposed amendments have also addressed extending Section 108 protection appropriately to include museums and other cultural preservation institutions that are not considered libraries or archives.¹⁰⁸

¹⁰² See, e.g., Maira Sutton, *Temporary Copies: A TPP Provision Disconnected from the Reality of the Modern Computer*, EFF DEEPLINKS BLOG (July 26, 2012), <https://www.eff.org/deeplinks/2012/07/temporary-copies-another-way-tpp-profoundly-disconnected>, archived at <https://perma.cc/9WHA-AQJA>.

¹⁰³ See *MAI Sys. Corp. v. Peak Computer, Inc.*, 991 F.2d 511, 518 (9th Cir. 1993); *Stenograph L.L.C. v. Bossard Assocs., Inc.*, 144 F.3d 96, 101–02 (D.C. Cir. 1998).

¹⁰⁴ UNITED STATES COPYRIGHT OFF., THE SECTION 108 WORKING GROUP REPORT 44 (2008), available at <http://www.section108.gov/docs/Sec108StudyGroupReport.pdf>.

¹⁰⁵ UNITED STATES COPYRIGHT OFF., SECTION 108 OF TITLE 17 – A DISCUSSION DOCUMENT OF THE REGISTER OF COPYRIGHTS (2017), available at <https://www.copyright.gov/policy/section108/discussion-document.pdf>.

¹⁰⁶ *Id.* at 25.

¹⁰⁷ *Id.* at 26.

¹⁰⁸ *Id.* at 17.

Although 17 U.S.C. § 108 may apply to some preservation activities, its limited scope means that most institutions rely upon the fair use doctrine for other aspects of their software and digital preservation efforts.¹⁰⁹ Because of this, the Copyright Office should not to limit the scope of this exemption by reading in the limitations of 17 U.S.C. § 108.

(C) 17 U.S.C. § 117

The proposed exemption also includes uses that may be non-infringing under 17 U.S.C. § 117. This limitation on copyright law authorizes the making of a copy or adaptation of a computer program by the lawful owner of a copy of the computer program under certain conditions.¹¹⁰

Under 17 U.S.C. § 117(a), the adaptation or copying of software by the owner of a copy of the software is not an infringement provided:

- (1) that such a new copy or adaptation is created as an essential step in the utilization of the computer program in conjunction with a machine and that it is used in no other manner, or
- (2) that such new copy or adaptation is for archival purposes only and that all archival copies are destroyed in the event that continued possession of the computer program should cease to be rightful.

This statute has been interpreted to follow “the recommendations of the Commission on New Technological Uses of Copyrighted Works [CONTU] with respect to clarifying the law of copyright of computer software.”¹¹¹ The CONTU Report recognized that the action of placing a copyrighted work into a computer could result in the creation of a copy and subsequently provided “that persons in rightful possession of copies of programs be able to use them freely without fear of exposure to copyright liability.”¹¹²

The first exception to a copyright owner’s exclusive rights, § 117(a)(1), contemplates the mismatch among programming languages and hardware, whereby “one who rightfully acquires a copy of a program frequently cannot use it without adapting it to that limited extent which will allow its use in the possessor’s computer.”¹¹³ Thus, under § 117(a)(1) the lawful owner can modify the software for internal use, “as long as the adapted program is not distributed in an

¹⁰⁹ See Library Copyright Alliance, *LCA Statement on Copyright Office Discussion Document on Section 108 of Title 17*, available at http://www.librarycopyrightalliance.org/storage/documents/LCA_Statement_on_CO_Sec_108_Discussion_Document.pdf (2017) (“The Document’s proposed amendments, while salutary, would not allow libraries to perform any lawful activity in which they are not already engaging under the fair use right codified in section 107.”).

¹¹⁰ 17 U.S.C. § 117.

¹¹¹ H.R. REP. NO. 96-1307 at 23 (1980), *reprinted in* 1980 U.S.C.C.A.N. 6460, 6482.

¹¹² FINAL REPORT OF THE NATIONAL COMMISSION ON NEW TECHNOLOGICAL USES OF COPYRIGHTED WORKS 13 (1979) [hereinafter CONTU REPORT], available at <https://repository.jmls.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1573&context=jitpl>.

¹¹³ *Id.*

unauthorized manner.”¹¹⁴ In addition, “the conversion of a program from one higher-level language to another to facilitate use would fall within this right.”¹¹⁵

The second exception, § 117(a)(2), permits the creation of a copy for archival purposes, where the owner’s original copy of software is susceptible to “destruction or damage by mechanical or electrical failure.”¹¹⁶ Some courts hold that permission is exclusive to software at risk of damage by mechanical or electrical failure.¹¹⁷ However, other courts have interpreted the provision more liberally, allowing archival copies to be made to guard against any type of risk.¹¹⁸ Those courts argue that since Congress did not list restrictions on the purposes for which archival copies are made under § 117(a)(2), an owner is allowed “to make an archival copy of that program in order to guard against *all* types of risks, including physical and human mishap as well as mechanical and electrical failure.”¹¹⁹

In *Vault Corp. v. Quaid Software Ltd.*, a case pre-dating § 1201, the Fifth Circuit held that Quaid’s product, the CopyWrite diskette with the RAMKEY feature, was capable of non-infringing uses under § 117(a)(2), even though it was used to circumvent the protective features on Vault’s PROLOK diskettes. This protective device on Vault’s diskettes was used to prevent the unauthorized copying of the software programs also located on those disks. The court ultimately determined that § 117(a)(2) allowed the owner of the PROLOK diskette to copy both the PROLOK program and the software program for any reason, so long as the owner only used it for archival purposes and did not transfer the copy.

Similar to *Vault*, there are many uses of TPM-protected software that qualify as non-infringing because they are for archival purposes under § 117(a)(2), and copies are necessary to eliminate the risk that the software will be damaged or destroyed. Many software programs are located on diskettes, such as Visicalc, Dig Dug, and Galaxian, which comprise just a few examples of the software the Living Computers: Museum + Labs has encountered recently with TPMs.¹²⁰ Here, the circumvention of the TPM to replicate this software is a non-infringing use under § 117(a)(2) because the museum desires to copy the software for archival purposes. It is necessary for the museum create copies to preserve the software so it can put the software on display for its visitors without risking that their only copies of the disks will be mishandled or destroyed.¹²¹

(3) Statutory Factors Support Granting an Exemption for Software Preservation

Because of the nature of this exemption, many of the factors required by the statute are explored by the sections above. However, there are some additional reasons why the factors support the grant of the exemption.

¹¹⁴ *Aymes v. Bonelli*, 47 F.3d 23, 26 (2d. Cir. 1995).

¹¹⁵ CONTU REPORT, *supra* note 113, at 13.

¹¹⁶ *Id.*

¹¹⁷ *See, e.g., Atari, Inc. v. JS & A Group, Inc.*, 597 F.Supp. 5, 9-10 (N.D. Ill. 1983).

¹¹⁸ *See Vault Corp. v. Quaid Software Ltd.*, 847 F.2d 255, 266–67 (5th Cir. 1988).

¹¹⁹ *Id.* at 267.

¹²⁰ Survey Response by Cynde Moya, Living Computers: Museum + Labs.

¹²¹ *Id.*

(A) Software and software-dependent material will be unavailable without an exemption.

Because of the orphan software problem detailed above, many software items have been lost to the public and many more are at risk.¹²² The Copyright Office recognizes that the orphan works problem is “widespread and significant.”¹²³ For software that is protected by TPMs, even fair use cannot protect preservationists from taking on significant legal risk.

For many use cases, there are not alternatives to circumvention of TPMs. As discussed above, software that is held by identifiable and available copyright owners is often not available to be licensed. The legal and commercial costs of providing licensing agreements to archivists is not offset by the value of capturing such a small market. When the holders of archived software copyrights are willing to license their software, the transaction costs of negotiating with hundreds of different publishers is beyond the already strained resources of preservation efforts.¹²⁴ Such costs will prevent the software from being licensed at all. Again, without an exemption, software and software dependent-material will continue to be lost.

(B) The exemption is necessary and targeted towards increasing availability for use for archival, preservation, and educational purposes.

As is perhaps obvious, the core purpose of this exemption is to allow preservationists to preserve, keep running, and thus increase the availability of TPM-protected software. Allowing those covered by the exemption to bypass software TPMs ensures that software and software-dependent material remain available for archival, preservation, research, and educational purposes.

First, the longer that software goes unexaminable, the greater the risk of loss. This is especially true for obscure software used for statistical and research purposes. Preservationists cannot determine the function or type of software that exists in unknown file formats without circumventing TPMs and examining software behavior. The software preservation community’s limited resources logically go towards preserving known entities. Over time, obscure software has an increased risk of being left behind or discarded. Unfortunately, this kind of software is often tied to potentially useful research-related software-dependent material.¹²⁵

Second, the study of software titles as cultural and scientific artifacts will only continue to grow. As discussed above, software studies scholars use analysis of software to better understand all sorts of disciplines and practices, ranging from how BASIC programming changed creative

¹²² See *The 'Bit List' of Digitally Endangered Species*, DIGITAL PRESERVATION COALITION, <http://dpconline.org/our-work/bit-list>, archived at <https://perma.cc/8MYV-AE6M>.

¹²³ UNITED STATES COPYRIGHT OFFICE, ORPHAN WORKS AND MASS DIGITIZATION 2 (2015), available at <https://www.copyright.gov/orphan/reports/orphan-works2015.pdf>.

¹²⁴ Rosenthal, *supra* note 54, at 17.

¹²⁵ See *The 'Bit List' of Digitally Endangered Species*, DIGITAL PRESERVATION COALITION, <http://dpconline.org/our-work/bit-list>, archived at <https://perma.cc/8MYV-AE6M> (noting that published research is endangered partially because of overzealous rights management and software dependencies).

computing¹²⁶ to how dance can be encoded into software.¹²⁷ Opportunities to study the evolution of software design, form, and function are lost when preservationists struggle to deal with collections rendered still by TPMs.

(C) Prohibiting circumvention for software preservation impedes criticism, research, teaching, and scholarship.

With so much of our information now born-digital or migrated to digitized formats, it becomes increasingly important that researchers, scholars, critics, and teachers have all the tools needed to access that information. As mentioned above in the discussion of “software-dependent materials,” software is critically important to archival access to digital files, and having working copies of outdated software is vital to preservationists’ ability to open older files. The special investigation papers of Watergate Special Counsel Leon Jaworski, for example, were inaccessible for a long period of time because the archives could not get permission to run the software to read the papers.¹²⁸ Continuing to prohibit circumvention for software preservation would deprive researchers in all fields of scholarship of a huge pool of valuable information.

Software itself is also an important subject for scholarship because improvements in future software programs depend largely on knowing about the flaws in older software and learning how older software was developed. In order to understand how older software functioned and analyze how software has evolved, researchers and scholars need to see how the software operates. For many outdated software titles, this would require circumvention of TPMs to modify the program for compatibility with emulators or current operating systems.¹²⁹

Avoiding circumvention requires archives, libraries, and other cultural heritage institutions to spend a lot of time tracking down and working with copyright owners and companies to gain access to obscure titles, often with disappointing results. With time being crucial to keeping up with software development, research cannot afford the delays around trying to locate copyright owners of orphaned works or working with companies who are unwilling to spend the time to draft licenses for inherited leftover software.

¹²⁶ See NICK MONTFORT, ET AL., 10 PRINT CHR\$(205.5+RND(1)); : GOTO 10 (2012).

¹²⁷ Scott deLahunta, *Dance Becoming Data; Part One Software for Dancers*, COMPUTATIONAL CULTURE: A JOURNAL OF SOFTWARE STUDIES. For more examples, see also *Software Studies*, https://monoskop.org/Software_studies.

¹²⁸ Interview with Peter Hirtle, Fellow and Past President of the Society of American Archivists, in Cambridge, Mass. (Nov. 15, 2017).

¹²⁹ Survey Response of Dragan Espenschied, Rhizome (discussing the use of emulation to use Internet Explorer 6 on Windows XP); Rosenthal, *supra* note 54.

(D) Circumvention of TPMs in software for archival purposes would have limited, if any, impact on the market value of the programs.

The software that archives and libraries are looking to preserve is often comprised of titles that are no longer commercially relevant.¹³⁰ For the most part, the circumvention efforts would not be creating any market competition because there is no market to begin with. Furthermore, the institutions have already legally acquired the software—circumvention simply allows the institutions to access a copy of something that already belongs to them. The archives are not looking to break into software that they do not own or have a right to use.

In past rulemakings, rightsholders have expressed concerns about the availability of knowledge of how to circumvent TPMs on other kinds of works, or that users will use the exemption to avoid buying new software. Such concerns are inapposite here. It is highly unlikely that circumvention techniques appropriate for software from the 1990s or the early 2000s would have any effect on the more advanced technological protection measures of modern software programs.¹³¹ Circumventing TPMs on older software would also have little impact on the market for current commercially available software, simply because the speed at which technology matures has left vintage software in the dust. It is unlikely, for example, that a significant number of consumers would prefer to use VisiCalc over Microsoft Excel for computational usage, and even more unlikely that such users would rely on archival institutions (or circumvention techniques employed by them) to acquire copies for ongoing use.

CONCLUSION

Digital preservation is exactly the type of activity the Section 1201 exemption process was meant to facilitate. The current ban on circumvention will have adverse effects over the next three years, continuing to inhibit the preservation of deteriorating software and software-dependent material objects. The forces that drive digital preservation run in the opposite direction of the market, suggesting that the market impact of the circumvention discussed in this comment will be minimal, if any. As Daenerys Targaryen brought the dragons back to Westeros, digital preservationists have the opportunity to revive that which may be lost. The Library of Congress, through granting this exemption, can help them do just that.

¹³⁰ See, e.g., *The quest to crack and preserve vintage Apple II software – tech podcast*, THE GUARDIAN (Apr. 28, 2017), <https://www.theguardian.com/technology/audio/2017/apr/28/apple-ii-vintage-software-1980s-tech-podcast> (explaining the circumvention of digital rights protection on old Apple II software which is no longer commercially relevant).

¹³¹ See Patrick Klepek, *The Anti-Piracy Tech That's Giving Hackers Fits*, KOTAKU (Feb. 17, 2016), <https://kotaku.com/the-anti-piracy-tech-thats-tearing-video-game-hackers-a-1759518600> (discussing modern digital rights management which is vastly different from historical TPMs).

USER STORIES AND STATEMENTS IN SUPPORT

Name of Submitter: Andrew Berger

Organization: Computer History Museum

Software Where Access is Inhibited: RealNetworks Real Developer Program CD: RealSystem G2 Preview Release

Statement:

The software reads the current system time and will not install or run unless the system is set to a narrow date range in 1998. I haven't worked out the exact date range, but know from experience that it won't accept dates too late in 1998 (after about September). It raises the barrier to installing the software because other software on the same machine may not run if the system clock has been manipulated. It is also vulnerable to changes in operating system functionality, as there's no guarantee that changing the system clock will remain a relatively easy thing to do.

In my experience, virtual machine software may not launch if the system clock has been manipulated, so I would start the virtual machine software and then change the system clock(s) and then install and run the software. This version of RealPlayer is no longer available, and in any case this specific CD was a preview release, not the commercial release. This CD is in the Computer History Museum collection under catalog number: 102685637

<http://www.computerhistory.org/collections/catalog/102685637>

Software Where Access is Inhibited: Windows XP

Statement:

In addition to having a license key, the software must be activated after installation. Aside from being a software object in itself, we use Windows XP as a platform for running older applications, as it has backwards compatibility not available in later versions of Windows.

We do this work locally using virtual machines and set up "clean" environments for new requests. Ideally, we would be able to make a snapshot of a clean installation of XP that we could reuse. However, clean installations of XP expire in 30 days if they are not activated.

Software Where Access is Inhibited: Visiplot/Visitrend (often bundled together)

Statement:

We have not identified the exact mechanism of the protection. The software cannot be run in an emulator without circumventing the protection. There is a documented method of copying one version of this title, but it does not appear to apply to other versions. The process of editing the code to circumvent the copy protection on one version of the software was documented in a magazine article in 1983:

<https://archive.org/stream/computist-scan-03/issue03#page/n7/mode/1up/search/visitrend+visiplot+backing+up>

In the Computer History Museum:

<http://www.computerhistory.org/collections/catalog/102639390>

<http://www.computerhistory.org/collections/catalog/102690323>

<http://www.computerhistory.org/collections/catalog/102680519> (Visiplot alone)

On the Internet Archive:

https://archive.org/details/Visitrend_and_Visiplot (crashes, possibly because of copy protection)

https://archive.org/details/Visitrend_and_Visiplot (appears to work)

Name of Submitter: Elise Tanner

Organization: Philadelphia Museum of Art

Software Where Access is Inhibited: Adobe Flash

Statement:

We do not know exactly what TPMs the software uses, or whether access will be inhibited, as we have yet to begin the act of digital preservation. We are in the research phase, though, and understand the nature of proprietary software and that it will affect our ability to preserve software-based artworks. In the process of handling the "master" files of a software-based artwork, if we reach a proprietary wall we will be unable to move forward with digital preservation process. If we cannot preserve the master file (the "best quality" or version "closest to artist's original creation"), it defeats the purpose of the entire process.

The piece I am referring to is Alfredo Jaar's "The Sound of Silence", a time-based media artwork created in 2006 that involves multiple physical and virtual components in its display. An Adobe Flash file controls various projection and lighting functions. Unlike other time-based pieces, there is no "media" element to this piece, as it is solely exists in the software. With that said, if we cannot access the software because of propriety blocks (copyright blocks), then this piece will inevitably be lost to bit rot and obsolescence. Preserving the artwork means preserving the software.

Name of Submitter: Dragan Espenschied

Organization: Rhizome

Software Where Access is Inhibited: Internet Explorer 6 for Windows XP

Statement:

IE6 came bundled with Windows XP, which asks to be activated. It is difficult to present certain artworks for Rhizome's Net Art Anthology without this incredibly popular browser, which essentially ruled the web for the first years of the century. We have a sophisticated emulation framework to run legacy operating systems and software, but Windows XP needs special care.

Essentially the second chapter of our program Net Art Anthology <http://anthology.rhizome.org/> is affected.

Name of Submitter: Heath Reinhard

Organization: Living Computers Museum

Software Where Access is Inhibited: Battle Droids, DarkSide

Statement:

At the Living Computers Museum, we attempt to preserve and exhibit historical significant artifacts from the history of computing. This includes hardware as well as software. We have a vast collection of software, mostly on 5.25" and 3.5" floppy disks.

These disks are somewhat fragile, and our policy is to make preservation copies of our floppies disks rather than allowing museum guests to handle the original media.

However, many of the software titles we would like to preserve and exhibit have some form or another of copy protection that does not allow us to legally make copies. This endangers our mission of preserving these software artifacts for present and future generations to study and enjoy.

Additional information about our institution can be found on our website: livingcomputers.org

You can search our extensive collection of hardware and software artifacts here:
<http://opac.libraryworld.com/opac/home.php>

Name of Submitter: Aliza Leventhal

Organization: SAA Design Records Section CAD/BIM Taskforce

Software Where Access is Inhibited: rhinosarus, grasshopper, formZ, sketchup, civil 3D, AutoCAD, Revit, Lumion, VRay, Maya

Statement:

Different forms of software are protected by dongles, licensing, access to older versions by not making older versions accessible, and by not making current versions backwards compatible.

We are losing the ability to access and experience design records in their original and dynamic forms.

Name of Submitter: Dene Grigar

Organization: Electronic Literature Organization

Software Where Access is Inhibited: Storyspace, HyperCard, Flash

Statement:

The software is proprietary but obsolete. We do not yet have legal option for saving the works of literary art that utilized those programs for their production and dissemination. There are 43 seminal works of pre-web hypertexts published by Eastgate Systems, Inc. on its proprietary software program Storyspace. All but two have been migrated for access on current operating systems. The rest of the works are left to remain inaccessible. Unless we can challenge the owner of the software to allow access to this work, this work will continue to deteriorate. Not only access to them but also their existence are both at stake. This problem is true of works produced with HyperCard and more recently Flash.

The Electronic Literature Organization has partnered with Washington State University Vancouver's Electronic Literature Lab and its library, the Electronic Cultural Textures Lab (ETCL) at the University of Victoria, B.C., and Compute Canada to create the Electronic Literature Archives (ELA). The next step is to set up Samvera so that the works in our seven collections can be made available via download of complete files for the work we have permission to share. We have submitted a grant to a foundation in support of this phase of the project. The new version of the software does not allow access to works produced on the earlier versions of it--save for only two works.

Here is a link to the Electronic Literature Lab's catalog: <http://dtc-wsuv.org/ell-catalog>; here is a link to the lab: <http://dtc-wsuv.org/wp/ell>. Here is a link to the ELO's ELA project: <http://eliterature.org/electronic-literature-archives/>

Statement of Henry Lowood
22 November 2017

I am writing as an individual in support of the DMCA exemption request submitted by the Harvard Cyberlaw Clinic on behalf of the Software Preservation Network. The purpose of this exemption is to allow cultural repositories (archives, libraries, museums) to legally circumvent technological protection measures (TPMs) for carrying out software preservation activities. My opinions do not necessarily reflect those of Stanford University, my employer.

Digital game preservation and archiving requires bypassing or defeating access controls built into game software.

Preservation activities undertaken by cultural repositories are impossible to carry out, if these institutions' curatorial and technical staff cannot fully access the software that is to be preserved. required to maintain these games. This statement is true for several reasons.

First, current digital preservation practices are universally predicated on data migration, which means the transfer of data from fragile, historical media to the robust technical systems that have been designed for digital preservation. Access to the original software and to the digital assets (maps, audio files, character animations, etc.) that make up a game or virtual environment is fundamentally important. If this access is blocked by a historical TPM, then there is no legal way for repositories to gain access to the original software, hence preservation for purposes of scholarship, teaching and other culturally important purposes is impossible.

Moreover, preservation without access to the software, both as data and as an executable program, becomes a meaningless activity. Use of historical software requires installation on contemporary hardware platforms or development of an emulation solution. Usually some modification of the original software will be necessary, in either case. Without access to the original software, TPM is an obstacle for preservation or research activities. It was not the intention of the software developers and publishers who created this historical software that TPM would block historical study and appreciation of their work. Circumvention of TPM restrictions is necessary, if cultural repositories are ever to provide access to historically important software titles.

The situation described above forces repositories and researchers into the uncomfortable situation of considering unauthorized circumvention of copyright law to preserve or provide access to game and virtual world environments, data, and software. These activities help repositories to inform and support the work of researchers, students, and others who wish to learn about the history of digital games, or any historical software for that matter. Without circumvention of current restrictions, many kinds of preservation and research projects effectively become impossible.

Henry Lowood
Curator for History of Science & Technology and Film & Media Collections
Stanford University