Stanford Law School
Law and Policy Lab
Copyright Licensing Practicum

Revising the Requirements for Software Registration

PRACTICUM TEAM:
Estelle-Marguerite Devisme, LLM in Law, Science and Technology ‘17
Katherine Ewell, BS Computer Science ‘17
Melina Haralabopoulos, LLM in Law, Science and Technology ‘17
Gerben Hartman, LLM in Law, Science and Technology ‘17
Yindee Limpives, LLM in Law, Science and Technology ‘17
Izabela Prager, LLM in Corporate Governance and Practice ‘17
Ignacio J. Pereira, LLM in Law, Science and Technology ‘17
Priyanka Sekhar, BS Computer Science ‘17
Thomas Zhao, BS Computer Science, BA Japanese ‘17

Paul Goldstein
Lillick Professor of Law, Stanford Law School

Luciana Herman, Ph.D.
Lecturer, Stanford Law School

Amit Itai
J.S.D. Candidate, Teaching Assistant, Stanford Law School

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The Policy Lab

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The idea for this study, the product of a six-month review of software registration practices across several software-related industries in the US, first emerged in a conversation between Professor Paul Goldstein and Jacqueline Charlesworth, the former General Counsel and Associate Register of Copyrights in the U.S. Copyright Office, about contemporary challenges to copyright registration for computer software. Rob Kasunic, Associate Register of Copyrights and Director of Registration Policy & Practice in the Copyright Office, quickly picked up the idea and with Erik Bertin, Deputy Director of Registration Policy and Practice, worked with Professor Goldstein and his Stanford Law School Policy Lab team of six graduate law students and three Stanford computer science students to lay the foundation for a qualitative study of software registration practices in a contemporary environment that includes cloud-based software and rapid development cycles. As the policy client for the project, the Copyright Office was an extraordinarily helpful partner and resource, even as it encouraged full independence for the research teams in examining the issues. We are particularly indebted to Rob Kasunic and Erik Bertin for their sustained interest in and support of the project.

The student teams interviewed 40 industry stakeholders—large firms and small, and inside and outside counsel—by phone, with follow-up questions both by phone and through email. Respondents were invariably gracious and generous with their time, and a special thank you goes to these respondents—all of whom were assured of anonymity—for candidly sharing their challenges with software registration and offering possible practical solutions. Without their generous contribution of information and ideas, this project would not have been possible.

To augment findings from exchanges with industry stakeholders, the research team applied for registration for two software products, each produced by members of the team's computer science cadre. The team then built on that first-hand experience to apply, pro bono, for software registration for stakeholder, JustFix.nyc. Overseen by the Mills Legal Clinic Juelsgaard Professor of Practice, Phil Malone, these three hands-on applications gave the research teams a personal understanding of the challenges that registration applicants may encounter. We are grateful to JustFix.nyc co-founder Georges Clement for coming to campus to explain the mission of his organization and the challenges of nonprofit software development, and to both Georges and his co-founder, Dan Kass, for their patience as we talked through the registration challenges that they, like other software nonprofits, may face. Particular thanks goes to Professor Phil Malone for closely guiding our research team in this first-hand professional experience with software registration.

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Executive Summary

The U.S. Copyright Office in recent years has responded to the rapid changes in software development by offering enhanced application tools and a smoother review process. Even these efforts, however, have failed to keep pace with the needs of software creators, developers, and distributors. Many software industry stakeholders have described a need for practical improvements in the registration process, including greater clarity in the rules that govern such crucial aspects as publication date, derivative work definitions, and the protocols for depositing source or object code. While registration remains common practice among larger companies with longstanding application practices, many in the software industry, particularly among newer or smaller companies, express frustration over the time it can take to navigate the registration process. Other industry stakeholders are shifting away from registration altogether, attributing the shift to the new paradigm of cloud computing.

As the software industry has evolved and, in some instances, migrated from resident (or "on-premises") software toward cloud-based products, many new developers have de-emphasized, or even excluded, copyright registration from their intellectual property practices. Several factors have contributed to this emerging posture: the cloud enables the delivery of software from the developer's presumably secure premises as a service rather than as a product, thus reducing the concern for copyright infringement. Also, some developers fail to fully appreciate the benefits offered by registration, and, for those who do register, the application process can be complicated by the increased use of third-party, open-source software from publicly shared code repositories. In light of these new features of the software production and distribution landscape, this report investigates not only the challenges associated with registering software in its traditional configurations, but also the implications of the at least partial shift to cloud-based and open-source configurations.

The Copyright Office has asked the Stanford Law and Policy Lab Software Registration Practicum to formulate options that will help it align its software registration regulations and practices with market needs and the public interest. Through interviews with industry stakeholders and Copyright Office officials, together with a review of current software registration practices and analysis of current law and regulations, this report evaluates options to improve the registration process (see Table 2, "Summary of Options"). The report distills information from corporate, nonprofit and independent developers and distributors of software, which was gained principally, although not exclusively, through their lawyers; it also relies on first-hand experience with pro bono registrations performed by the practicum team.

Findings

Through stakeholder interviews, the Stanford Law and Policy Lab research team made several key findings regarding the problems that copyright registration applicants may encounter. Although the obstacles vary from one sector of the industry to another, stakeholders across the software development industry universally described challenges with copyright registration.

1. Registration guidelines for derivative works are not clear and frequent registration updates for these works are impractical.

The software industry is experiencing a shift to faster development cycles, in part because of the ability to deploy new code to customers instantaneously via the cloud. The public release of derivative works based on existing software is no longer limited to formal, hard-copy new releases

signifying major—2.0, 3.0, 4.0—or incremental—2.1, 2.2, 2.3—changes. Instead, today's software changes and updates can occur on a weekly or even daily schedule. These rapid development cycles raise concerns among industry stakeholders about the frequency with which the Copyright Act contemplates registration of successive versions of a software product. Developers and stakeholders across the industry voice concern about the lack of clear direction in Copyright Office guidelines for updating derivative works and, entirely apart from this, they complain about the impracticality and expense of frequent registration updates.

2. Documenting authorship for open-source code can be complicated and impractical.

Stakeholders who work with open-source code complained about the difficulty of identifying and accurately describing in their registration applications all of the rights holders in the code incorporated in their products. Adopting and modifying open-source code is now a commonly accepted industry practice, and it is not uncommon for dozens of open-source projects to be incorporated within a single work. Open-source code is often developed by hundreds or even thousands of contributors. These contributors may be based anywhere in the world, and many of them may only be identifiable through user names. This raises the question of how these pre-existing works should be identified during the registration process, since identifying all of the rights holders of open-source code and documenting specific authorship can be impractical for registrants, if possible at all. While the Copyright Office recommends registering only the code written specifically by the registrant, that code itself may be intricately bound to pre-existing open source code that is subject to these documentation challenges.

3. Guidelines for documenting publication date are not aligned with the current reality of open-source, cloud-based software.

The present TX registration application form asks whether the work has been published and, if so, when. These questions can be decisive for several reasons. Publication is defined as "the distribution of copies or phonorecords of a work to the public by sale or other transfer of ownership, or by rental, lease, or lending" (17 U.S.C. § 101). However, with cloud computing, computer programs can be accessed by other developers and disseminated to a vast public without the individual distribution of copies, making the legal question of publication uncertain for cloud-based and open-source developers. Thus, applicants face the challenge of interpreting the Copyright Act and the Copyright Office's guidelines promulgated under the Act to evaluate whether their claim involves a published work when the work is publicly accessible but copies of the underlying code are not distributed.

4. The unit of publication rule and cloud-based software.

Traditionally, computer software has been covered by the unit of publication rule, which allows registration through a single application if the registration includes "a package containing a computer program and a user's manual" (Compendium, 3d, §1107.1). According to industry stakeholders, the Copyright Office now rejects single applications of electronic files and documentation that are bundled together as a single unit and published on the same date via the cloud. Some cloud-based industry stakeholders say such rejection is neither efficient nor cost-effective for them and could be resolved by applying the unit of publication rule to cloud-based software where electronic files and documentation are bundled together. The Copyright Office, however, points to three major obstacles preventing the application of the unit of publication rule to cloud-based software: (1) a lack of tangible evidence of public distribution in a single package, (2) disaggregated files, and (3) the likelihood that cloud-based software is unpublished.

5. Multi-platform software: Tradeoffs between single and multiple registrations.

Copyright Office practice treats each version of a computer program that is designed for a different platform as a separate work and, consistent with registration policy generally, requires one registration per work. However, it is common for developers to make software that functions in different versions across various platforms. Though many or even most components may be shared across the different versions, each version will likely also contain code specific to the platform for which it is designed. Furthermore, these versions are not always released across all platforms simultaneously, complicating the issue of determining publication date. It is currently unclear how best to handle this phenomenon: a single registration may not adequately cover the platform-specific components, while applying for – and then continuing to update -- separate registrations for each platform may be onerous for the applicant. Stakeholders have expressed their desire for a "group" registration procedure that could encompass several closely related works in a single registration, or, alternatively, a procedure that would allow them to specify multiple related platforms within a single registration.

6. Deposit rules and the protection of trade secrets.

The current Copyright Office regulation requires deposit of the 25 first and last pages of source code. Code, however, is written not in a page-format, but in "lines". Therefore, a single computer program may consist of one or more distinct files that contain one or more lines of code. In order to protect trade secrets included in the code, the Copyright Office permits companies to manually block-out, or redact, parts of code including trade secrets from the deposit. Transposing "lines" of codes to "pages" and blocking-out creates a non-negligible cost to stakeholders – start-ups, non-governmental organizations and multinational companies alike – as it requires time from engineers who might otherwise be developing new content. Although this does not appear to be a new problem, stakeholders have expressed their dissatisfaction with Copyright Office deposit requirements which, they believe, do not reflect the needs of companies and developers or the realities of modern coding.

7. Incomplete understanding among small business, nonprofit, and individual software developers of the value associated with registration for software.

Many developers and engineers fail to understand the benefits of registering their software, and would profit from more information from the Copyright Office about the advantages conferred by registration. The lack of understanding about the value of registration is more noticeable among small companies and low-budget organizations and start-ups than among larger businesses that regularly integrate registration into coordinated work flows between engineers and in-house or outside counsel. Although some developers are aware that the Copyright Office website includes information about the value of registration, most turn to attorneys as the primary source of information about registration. Without their attorneys encouraging registration, many developers are less inclined to register.

8. Stakeholder concern about the security and timeliness of Copyright Office records management.

Some stakeholders described their desire for improved access to, and Copyright Office retention of, executable software deposits. Others expressed concern about possible public access to code that includes trade secrets in executable copies. In instances of infringement, stakeholders are concerned that current Copyright Office records management may hinder their timely access to an executable copy of the registered work.

This report identifies alternative approaches and improvements to copyright registration for computer software which can provide the basis for a Notice of Inquiry (see Appendix 2, “Draft Notice of Inquiry”). The report supports Copyright Office efforts to improve the flow of information about the value of registration for potential software industry applicants. This report also offers a vision for an improved eCO registration tool which would ameliorate some of the ambiguities and challenges for software registration inherent in the current platform. In aligning its registration practices and tools with the needs of the digital age, the Copyright Office has the opportunity to enhance protection for new creative works and the technologies that support them.

Introduction

Since John F. Banzhaf submitted the first application for copyright registration for a computer program in 1964--for code that calculated automobile braking distances--the software industry has progressed exponentially, most recently in a shift toward rapid, often open source, cloud-based development cycles. Unlike the pre-planned, formal new releases—2.0, 2.1, 2.2., etc.—of earlier days, today's software updates are often issued on a weekly or even daily basis. These rapid production cycles have prompted concern among industry stakeholders about the frequency with which they should register their software updates with the Copyright Office and, in some instances, the general value of registering cloud-based software at all.

Over the past decade, the Copyright Office has updated rules governing the registration, deposit, and public access to records for computer software with the goal to "promote lawful use of copyrighted works and compensation to creators by providing timely, easy-to-use public services (including registration, recordation, and statutory licenses)"[1] In 2007, the Office released eCO, its first online copyright registration tool. eCO enables creators to register and deposit individual works via an online questionnaire and upload tool. Once registered, these works are publicly searchable with basic information available online. While the eCO tool operates with relative efficiency for traditional content, the Copyright Office recognizes that changes in software development may have outpaced the capacity of the system. Indeed, in recognition of the complexity of software registration, the Office typically sends applications to register computer programs to highly trained senior examiners.[2] Although the examiners reject fewer than 3% of these applications, they also acknowledge limitations in the current system and have expressed the need for a new electronic registration system.[3] Examiners further state that, while most software registration applications require no more than 15 minutes to review, some involve multiple, highly documented, email exchanges with applicants to clarify information and correct errors and misunderstandings.[4]

Thus, as part of the effort to continue to improve its registration procedures for software developers, the Copyright Office asked the Stanford Law School Policy Lab Copyright Practicum to explore new methods and technologies to support the flow of ownership information for software.[5] Part 1 of this report presents findings from interviews with 40 stakeholders who represent different parts of the software industry. Part 2 focuses exclusively on findings related to cloud-computing. Part 3 builds on findings related to the eCO platform to develop a prototype for a new, low-friction, online intake registration portal for the Copyright Office. While the findings and related options are not exhaustive, they are useful in helping the Copyright Office consider enhancements to protections for software.

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[11] U.S. Copyright Office, *Strategic Plan, 2004-2008,* https://www.copyright.gov/reports/strategic2004-2008.pdf. Accessed June 20, 2017.

[2] See "Questions for USCO Examiners about Software Registration Applications," answers from examiners received via email from Rob Kasunic to Paul Goldstein, March 28, 2017.

[3] *Ibid.*

[4] *Ibid.*

[5] *Ibid.* Furthering its efforts to clarify its procedures, the Office in June 2017 released for public comment a revision to the Compendium, which describes registration criteria for computer programs, but still does not fully address the concerns of software industry stakeholders described in this report.

Methodology

Research for this report includes findings from qualitative interviews with 40 industry stakeholders and high-level representatives of the Copyright Office. To assess needs from across the industry, the Policy Lab research team divided interviews into categories representing large software corporations, smaller start-up companies, nonprofits, independent developers and distributors of software, and their legal counsel. These categories include:

- Attorneys in private practice who handle copyright registrations on behalf of software developers. These attorneys were chosen as representatives for large law firms, small firms, and solo practices.
- In-house corporate counsel and paralegals for startup and large technology companies. Some served as the intermediaries between the engineers and the outside counsel of the firm handling the application.
- Founders and engineers at start-up platforms, large open-source repositories, and non-profit developers.
- Independent developers.

These stakeholders represent diverse types of software products, including resident software distributed in hard copy; cloud-based online downloads; client-specific or provider-specific software; and software built on a foundation of open-source code. While most respondents represent organizations that offer diverse computer products, some are from companies with products built for the use of specific industries or purposes such as videogames, business search engines, and legal support. Although this array of industry stakeholders is not exhaustive, or necessarily even representative, its diversity can, at the very least, support the scope of an exhaustive Notice of Inquiry.

In Phase 1 (fall 2016), this project developed a master set of questions related to registration which we adapted according to stakeholder interests. As a means of tracking information across categories, we entered the questions into a Qualtrics research platform. We set up telephone calls with each stakeholder, speaking with them, on average, for 20 minutes, with the goal of an open-ended conversation about their experiences with software registration. We entered their answers into the Qualtrics database and then summarized those answers in short memos, which we discussed collectively at our weekly team meetings. Mid-way through the fall term, the research team met in video conference with both the Director and the Deputy Director of Registration Policy & Practice to share initial findings and obtain their guidance for further research. At the end of Phase 1, the team distilled the collective findings into an internal memo detailing issues both across and within industries.

In Phase 2 (winter 2017), the research team reviewed findings for each stakeholder to prepare for follow-up interviews which took place by phone or by email, according to the stakeholder's preference. The student teams shared their findings in memos for discussion with the entire practicum and then prioritized issues into two main categories: (1) issues related to the stakeholder's immediate experiences with Copyright Office registration guidelines, regulations, and platforms - both paper TX and eCO; and (2) issues pertaining to cloud-based software. Those issues now comprise the two major sections of the research report.

To learn more about challenges that stakeholders encounter in the application process, we worked directly with three different developers to register their software. Two of our computer science team members offered their independent software for registrations: the first of these

dynamically tracks stock market data and the second generates two-factor authentication codes used to secure online accounts. With legal support from the Mills Legal Clinic Juelsgaard Professor of Law, Phil Malone, we examined each step in the application process, thinking through not only the factors that confronted our team members in their roles as independent developers but also the issues that industry stakeholders might encounter. We leveraged this experience to then work on a pro bono basis with a nonprofit organization developer, applying for registration of the organization's interactive software platform. In both instances, the developers based their work on existing open-source code, which offered us insight into the challenge of differentiating their creative products from underlying open-source code for purposes of registration.

After careful review of the current Copyright Office online eCO registration platform, our research teams developed a new, streamlined prototype, with interactive features designed to alleviate some of the concerns voiced by stakeholders and aid novice software applicants. This prototype is featured in Part 3 of this report.

Findings

1. Current registration process challenges

Through stakeholder interviews, the Stanford Law and Policy Lab identified several key findings regarding the problems that prospective copyright applicants face in the US.

1.1. Barriers to registering derivative versions, including frequency of updates

Stakeholders unanimously described challenges related to registering derivative versions of their software products.[6] They described the compelling business need to update software products regularly and release new versions; yet these same constant updates can make the registration process potentially burdensome for developers. Stakeholders consistently described a general need for a streamlined method to register updated works.

Stakeholders understand that copyright protection for derivative works encompasses the new authorship added to preexisting works, including third-party works, and that the date of publication for each new version is legally important because it determines whether the new version was timely registered prior to infringement (or within three months of publication for works infringed during that three-month period) making the copyright owner eligible for statutory damages and attorney's fees.

Stakeholders recognize the intent of the law to encourage the registration of each new version as a derivative work. Stakeholders generally agreed, however, that the current protocol for updating applications for already registered software could be streamlined. They pointed out that the current protocol, which requires submitting a full registration application for each derivative work, is time-consuming and burdensome. They requested a streamlined, low-friction method that would enable simple derivative work updates to existing registrations. Some expressed a wish for an automated system to register different versions of a single piece of software. All stakeholders said that improved eCO templates could be helpful for registration of independent and derivative

[6] The *Compendium,* 3d (rev'd 9/29/17) describes a derivative work as "a new version of a computer program." See chapter 500, 24.

works alike. As one multinational stakeholder observed, the inability to update or delete the templates easily or en masse is burdensome. This stakeholder also highlighted a related problem: When a user edits an existing template, eCO creates both a new template *and* preserves the old one, which can result in confusion if the registrant pauses mid-way through a registration and returns later to finish it.

One high-level manager for an open-source code repository mentioned an interest in working directly with the Copyright Office to enable affiliated open-source developers to register directly on the repository site linked to the Copyright Office portal. This would require an open API from the Copyright Office that would allow outside software clearinghouses to develop Copyright Office registration portals.

A large software developer also highlighted a semantic, but relevant, difference between the paper TX form and the eCO platform in the context of derivative works. Although Space 6a ("Preexisting Material") on Form TX presents interpretational issues, it corresponds to the language of 17 U.S.C. § 409(9), which requires that a derivative work or compilation application include "an identification of any preexisting work or works that it is based on or incorporates...." In the eCO application, this field is described as "Material Excluded," which, because the word "excluded" is not present in the statute, may be confusing for applicants seeking registrations of derivative works.

1.2. Frequency of updates in the cloud environment

Respondents indicated that the widespread shift to a cloud environment results in a higher frequency of updates to software. When software was distributed in hard-copy, on-premises or "resident" form, updates generally occurred only with new formal releases, which were relatively infrequent. This made registering derivative works (*i.e.,* new releases of software) relatively straightforward at the time of each new release. Today, the cloud enables developers to make updates easily accessible to consumers, thereby meeting market demands through frequent updates.

Stakeholders did not all understand that, from a practical perspective, not every new version needs to be registered for the software to be protected. Stakeholders without access to legal advice also did not fully appreciate how the law applies to the realities of infringement.

Generally, it would be unlikely for an infringer to infringe only the authorship contained in an update or the derivative authorship in a new version. In most cases, the infringement will overlap with the underlying program and the updates. Thus, if the underlying computer program was registered, it will usually be infringed together with the updates. The fact that the updates weren't registered would be material only if no expressive content in the underlying program was also infringed. As a practical matter, a software owner may decide to register only those updates that constitute separate and distinct modules that might be infringed separately. Respondents generally understood their responsibility in making a business decision about updates to software but they were less certain about how to make judgments when an update contains authorship that has sufficient independent economic value to warrant registration for statutory protection.

With rapid development cycles, including updates to and derivatives of existing products, an embedded reality of today's software industries, stakeholders across industries expressed concern about the frequency with which they are supposed to register code. A respondent with a

significant product line used the metaphor of "constantly pushing new code." Other respondents, when asked how often they update their software, said "every week, sometimes every day." Stakeholders repeatedly pointed out the impracticality of registering every single update or release for software that changes weekly or daily.

Stakeholders cited differences in the guiding language for registering derivative works between the paper TX form and the eCO platform, as well as a lack of clear guidelines in the Circular and Compendium. In response to applicants' need for guidance, the Copyright Office could supply registrants with such information in the Circular or Compendium with a reminder that an applicant's own legal counsel is best situated to make the necessary case-by-case judgment.

Options:

- Clarify information to guide applicants on registering derivative works, including resolution of differences in language between the paper TX form and eCO platform
- Develop an automated means to register different versions of a single piece of software
- Alter the eCO template to accommodate group registration and streamline updates for derivative works
- Develop an open API that would potentially enable automated registration through open-source developer portals

1.3. Definition of publication for cloud-based works

Although the text of the Copyright Act offers little guidance for the registration of cloud-based computer programs, in Chapter 1000 of the Compendium, the Copyright Office has recently expanded and clarified guidance for publication online. Even so, claimants assert that registration for cloud-based works requires them to make challenging factual and subjective assessments as to whether a work has been published within the terms of the statute. Specifically, respondents pointed out that there may exist only a single copy of the computer program that remains under the control of the copyright owner and is inaccessible to users. Yet the rule defines publication as the public distribution of "copies" by means of electronic transmission. Thus, cloud-based developers asked whether the traditional definition of publication applies to cloud software since, technically, no copy of the code for such software is ever publicly distributed.

The question whether software has been published, and, if so, when, is decisive for several reasons. Among them is that the deposit requirement differs for published and unpublished works. Second, in light of the *prima facie* effect of a timely registration, the year of publication indicated in the registration may establish the term of the copyright (17 U.S.C. § 410(c)). Third, in the event of infringement, the copyright owner of a work that is registered before the infringement began or within three months after the work's publication may be entitled to an award of statutory damages and attorney's fees in a lawsuit (17 U.S.C. §§ 412, 504(c), 505).

Publication is defined as "the distribution of copies or phonorecords of a work to the public by sale or other transfer of ownership, or by rental, lease, or lending" (17 U.S.C. § 101). When a computer program is made available to the public through the cloud, without the distribution of physical copies or even download deliveries, there may exist only a single copy of the underlying code that remains under control of the copyright owner and is, as a copy, inaccessible to users. The functionalities embedded in cloud-based software can be accessed via a web browser or an

application developed for internet-connected devices as completely as if the user possessed a copy of the program. In the Copyright Office's view, an actual distribution of copies must occur in order for the work to be considered published: "Software is distributed when copies are distributed by purchase or license, whether in CD-ROM format or online (provided that the copies are actually downloaded and not merely accessed online)" (Compendium, 3rd edition, Chapter 600:60; *see also,* Chapter 1900:7). This interpretation is based on the legislative history: "The definition [of publication] clears up the question of whether the sale of phonorecords constitutes publication, and it also makes plain that *any form or dissemination in which a material object does not change hands*—performances or displays on television, for example—*is not a publication no matter how many people are exposed to the work* (H.R. Rep. No. 94-1476, at 138 (1976), emphasis added).

In formulating its definition of publication, Congress presumably did not envision cloud computing. but rather performances of, for example, songs and motion pictures. The statutory concept of publication, as depending on the distribution of copies, aligned with the realities of software markets in the past when distribution of a computer program entailed dissemination to the public of physical copies embodying the work and underlying code. Today's cloud computing allows computer programs to be accessed by the public without physical distribution of copies. Thus, today's cloud computing applicants face the challenge of interpreting the statute and Copyright Office guidelines to evaluate whether or not their claim involves a published work when such work is publicly accessible but copies of the code are not distributed.

In general, as an experienced lawyer in private practice stated, referring to his clients: "Most of them treat it as published if they are actually distributing downloads, and if they are running it in the cloud they tend to treat it as unpublished, because they are not distributing physical bits, or source code, or anything like that." Our conversations with Copyright Office officials indicate that the Office agrees with this interpretation: "It seems reasonable for cloud-based companies that do not distribute their works and that prohibit reproduction to consider their works unpublished. If a work is only displayed, performed or used online without distribution or authorized reproduction, it could be deemed unpublished."[7] However, less experienced applicants such as independent programmers and small and medium-sized enterprises may remain confused about the effect of cloud-based services on publication. Specifically, although the Copyright Office position on the question is clearly stated in the *Compendium* (3d edition, Chapter 1900:5), stakeholders do not always align with Copyright Office policy with some registering cloud-based software as unpublished works and others as published (Table 1).

Table 1: Industry disagreement about publication for cloud-based works

Question: Is cloud software's underlying code registered as published work?

Name	Yes	No	Comments
Large international law firm with copyright & IP practice	X		
Privately held data application software company		X	Not cloud-software / registration before publication
Solo practitioner IP attorney		X	Usually firmware

[7] Email correspondence between Paul Goldstein and USCO officials, August 1, 2017.

Large cap, publicly traded software company	X		There is download delivery
Large law firm with copyright & IP practice	X		Typically, although not always
Large-cap, publicly traded software production company	X		Download delivery
Privately held code repository hosting service	-	-	Does not register
Large law firm with copyright & IP practice		X	When software is exclusively cloud-based
Mid-size law firm with copyright & IP practice	X		
Mid-cap online business review company	-	-	Does not register
Large-cap business software developer company	X		
Large-cap business software developer company	X		
Large-cap, multinational software developer	X		
Large-cap, multinational software developer		X	

Chart summary: This chart highlights findings selected across stakeholder groups. Smaller nonprofits and independent developers are omitted because our data on such groups indicates that, as a standard practice, they do not register their software. Findings for major stakeholders that do regularly register their software reveal: Out of four lawyers in private practice, three said that they register cloud-based software's underlying code as a published work, while one of them would always consider it unpublished if there were no download delivery option available to the user. Only one of six large computer program companies stated that it registers cloud-based software as unpublished works under those circumstances.

The Copyright Office could, in its application information, provide instructions on whether and under what circumstances cloud-based computer programs should be deemed published, although, to be sure, applicants will be required to make the factual assessment whether their work consists solely of a cloud-based computer program.

Options:

- Further clarify in the Compendium the definition of publication for cloud-based software; enhance registration materials to guide applicants on the application of the definition to cloud-based software. (See Section 3 for a prototype registration system with built-in, automated guidelines for applicants.)

1.4. Open-source code authorship

Large software companies and companies that use open-source platforms are concerned about how to determine authorship of their software. Contributors are often distributed across the country, and even across the world, which makes determining authorship difficult. Furthermore, some companies use paid contractors, whose work may or may not constitute "works made for hire" under applicable law. Additionally, hundreds of people may contribute authorship to software products, and listing all authors in an application can be difficult to manage. One multinational stakeholder stated that it has an internal process in which its developers fill out an online form that asks *inter alia* for the authorship information, which is then used by the legal team in preparing the eCO applications.

Much of today's software is based on pre-existing open-source code, which may have been developed over time by hundreds or even thousands of individual contributors. These contributors may be based anywhere in the world and many may be identified only through their user names. Adopting and modifying open-source code has now become a commonly accepted practice within the industry, and it is not uncommon for dozens of open-source projects to be incorporated within a single work.

The Copyright Office takes applicant statements respecting authorship and ownership at face value and allows a large number of authors to be named in the application if the work is represented to be a joint work. The eCO application enables applicants to enter information about the contributions of multiple authors with no limit on the number of authors who may be named in the application. Authors who collaborate on a program under an anonymous user name (or names) may designate their user name as a pseudonym. The requirement that each individual must be entered separately into the eCO application, may be viewed as burdensome by some applicants.

Recognizing these difficulties, one respondent for a large multinational suggested that, to better serve the exigencies both of litigation and portfolio-review, the eCO application should allow applicants to describe the contributions of each developer in a single application, as allowed in Form TX.

While individual creators may individually register their own individual work, some wonder how to identify such work when it is interwoven with preexisting works of others. They point out that identifying all of the rightsholders of open-source code and documenting specific authorship—even for their own discrete code—can be burdensome, and sometimes impossible. As one Copyright Office official put it: complexities that can result after creation may preclude registering the resulting work on one application.[8]

This issue may have no easy solution, although the Copyright Office has expanded its guidance in the most recent revision to the *Compendium* as follows:

- Joint works: The nature of the individual contribution is largely irrelevant, since each author has an undivided ownership interest in the work as a whole (see *Compendium*, 3d, 9/29/17, §§ 505.1, 505.2).
- In the case of collective works that are selected, coordinated or arranged by one or more persons, it is not necessary to name the authors of the component works. If the component works are fully owned by the collective work author(s), the registration for the collective

[8] Email correspondence from the Copyright Office to Paul Goldstein, August 1, 2017.

work as a whole will cover the component works even if they are not listed in the application (see *Compendium, 3d*, 9/29/17, §§ 508, 509).
- In the case of collective works where contributions are individually owned as distinct works, each author/contributor must make a separate application for his or her respective contribution (see *Compendium, 3d*, 9/29/17, §§ 508, 509).

As the Copyright Office acknowledges, each scenario may have myriad variations. The greater the number of contributors involved, the more complex the analysis becomes for the examiner.[9]

Options:

- Align the eCO application with Form TX, which permits applicants to enter information about the contributions of multiple authors in a single application
- Offer online chat options with Copyright Examiners who can guide new applicants on registering software, including guidance on open-source code with multiple authors

1.5. Unit of publication rule

"Collective work" is a statutory term, while "unit of publication" is a regulatory accommodation for the packaging of separate fixations bundled together in an integrated unit, allowing them to be registered together if they were distributed publicly as a discrete physical package. The unit of publication rule allows registration for multiple works by means of a single application, fee payment and set of deposit copies where the works are bundled for public distribution as a single integrated unit. The deposit must demonstrate the integrated nature of the works. Traditional over-the-counter computer software is covered by the unit of publication rule when it is part of "a package containing a computer program and a user's manual" (*Compendium*, 3d, § 1107.1). Physical software packages consisting of a computer program on a disk and a physical manual (like cover art, liner notes, and a collective work CD) qualify for this exception if these separate physical fixations were distributed to the public as an integrated unit and if all of the items were first published together. For downloaded software, the documentation may be integrated with the program (help text) or may be a separate file.

The complexity of digital deposits can present a challenge under the unit of publication rule. Thus the Copyright Office takes the position that software that is distributed electronically cannot be registered under the unit of publication rule. One multinational developer of computer programs stated that it has generally been able to register a "bundle of files" in one application for its software. Therefore, when the Copyright Office rejects a software registration, the cause appears to be related to the deposit of "files" in combination with (electronic) "documentation." This stakeholder indicated that the registration of the documentation related to its software was not as valuable as registration of the software itself.

The Copyright Office rejects application of the unit of publication rule to electronically distributed software (*i.e.,* files and documentation). Consequently, claimants must file multiple applications to register cloud-based works (*i.e.,* files and documentation) that are bundled together as a single unit and published on the same date "via the cloud" but not physically packaged or bundled together. One stakeholder who registers many such works voiced frustration with the current

[9] Email correspondence from Copyright Office to Paul Goldstein, August 1, 2017.

practice, complaining that "The CO's interpretation/enforcement of this rule makes it burdensome for the claimant to seek registration of its supporting documentation when there's no physical distribution by requiring separate applications for each document. The CO indicates that it wants to bring procedures in sync with our online world but this runs completely against that position because the distribution of software is almost exclusively online now."

Stakeholders suggest as a possible solution that the Copyright Office could treat packages of files and documents pertaining to one and the same computer program as a single, integrated unit, whether the computer program is made available as an electronic bundle or as a physical bundle, which would streamline and make the application process less costly.

The Copyright Office cites three major obstacles to applying the unit of publication to cloud-based software: (1) a lack of tangible evidence of public distribution in a single package, (2) disaggregated files, and (3) the likelihood that cloud-based software is unpublished. The Copyright Office requires tangible evidence of public distribution in a single package. Without such evidence, the Office cannot objectively distinguish between multiple works and one integrated work or collective work. The Office describes the digital deposits it receives as rarely demonstrating the creative selection, coordination, arrangement, or integration for a unit of publication. The deposit of compressed, bundled electronic files in a zipfile offers no objective means of ensuring that the work is, indeed, a single unit packaged and distributed to the public in that form. Moreover, many cloud-based works are unpublished, categorically depriving them of treatment as a unit of publication. Although the Copyright Office describes the integrated nature of the files as the most important aspect of the unit of publication, cloud-based software fails to meet the requirements in multiple ways.

Options:

- If the rules for bundled electronic files and documents pertaining to a single program cannot be aligned with those applying to physical bundles (*Compendium,* 3d, §1107.1), clarify for cloud-based stakeholders the obstacles in applying the unit of publication rule to electronic files

1.6. Multi-platform software registration

Videogame stakeholders expressed confusion about the rules for registering the common elements of multi-platform computer programs, which seem to be shifting in response to industry concerns. The Copyright Office distinguishes a videogame's audiovisual content from the computer program that generates the game and encourages videogame companies to register audiovisual content. Typically, for example, a video game developer creates different versions of the computer program, while maintaining as much consistency as possible in the audiovisual content, in order to achieve compatibility with multiple hardware and/or software platforms. These versions are not necessarily released simultaneously and it is not uncommon for a videogame to be made available exclusively on one platform for a period of time and then be published to other platforms after the original exclusivity period ends. The publication to other platforms usually entails the revision of code to enable compatibility. The game is largely the same, the platform is different.

The Copyright Office, in principle, considers each such version of the work to be different and requires one registration per work to the extent that each work contains separable copyrightable material that does not appear in any of the other components—both audiovisual material and the computer program itself. According to the Compendium, "writing new computer code for a published videogame so that the work can be released on a different platform" qualifies as a derivative work under Copyright Office guidelines (*Compendium*, 3rd edition, Chapter 800:98). At the same time, Copyright Office officials state that claimants do not need to register multiple iterations when those iterations are closely aligned with the underlying original work. According the Copyright Office, under *Computer Associates v. Altai*, the differences between code that is developed solely for purposes of interoperability with a different platform may not demonstrate copyrightable differences. To further ameliorate stakeholder misunderstanding about registration for closely aligned derivative versions, the Copyright Office might add a short example to the Compendium and/or Circular 61 describing a situation where a derivative work does not need to be registered.

For purposes of clarity in legal proceedings, the Copyright Office requires applicants to specify the information related to the platform in issue in the Note field for online applications, or in a cover letter for paper applications (*Compendium*, 3rd edition, Chapter 500:36). One stakeholder stated that it inserts a suffix that designates the platform after the title of the work in each application. A spokesperson for the Entertainment Software Association ("ESA") described the association's work with the Office to streamline the registration process: "[W]e are trying to figure out a way to have a single way of registering the same title of work, even though the underlying code that makes the software work differently for different systems may be a bit different for utilitarian purposes." In response to such requests from the ESA and its members, the Copyright Office has recently reduced registration friction by allowing applicants to note that the one version registered is contained in the same game in multiple platforms.[10]

The issue of software adapted to different platforms is not exclusive to the videogame industry. A large international stakeholder that develops business applications pointed out that its software is distributed in many languages for various platforms. That company would prefer to see a group registration that covers every version of the software. Further, when a single work has different versions, stakeholders argue that it can be troublesome for copyright owners to determine the appropriate version to register in anticipation of possible infringements across the various versions.

In streamlining registration procedures for multi-platform works, the Copyright Office could extend improvements for videogame registrants to other software applicants by allowing applicants to file a single application that comprises not only the claim for the audiovisual material and the underlying computer program but also adaptations for multiple platforms. For other types of multi-platform computer programs, a group registration that covers every version of the software could help resolve this issue.

Options:

- Develop new registration procedures for multi-platform software that enables applicants to file a single application that includes not only the claim for the audiovisual material and the underlying computer program, but also adaptations for multiple platforms
- Include the option of a group registration format for multi-platform software

[10] Email correspondence from Copyright Office to Paul Goldstein, August 1, 2017.

1.7. Deposit

For purposes of registration, code can be deposited in the form either of source code (human-readable) or of object code (machine-readable). Object code is registered under the *"rule of doubt*," meaning that it is not directly examined by a Copyright Office examiner. Object code deposit is sufficient for gaining access to court, but it does not guarantee the presumption of validity and ownership of the copyright.[11] The rules governing the deposit of computer code are viewed by many stakeholders as baffling or time-consuming, at best, particularly in connection with the steps applicants must take with the deposit to protect the trade secrets residing in their code. The Copyright Office acknowledges that "for litigation purposes, the deposit should be the most important part of the registration record, because it defines exactly what was included in the work at the time it was registered." Yet, in the view of some copyright owners, the requirements for software are vague and may not be robust enough to guarantee a claimant's assertion of rights in court.

1.7.1. Ambiguities in the deposit requirement

Some stakeholders said that they do not understand the rationale for the deposit requirement of the first and last 25 pages of code (C.F.R. Title 37, § 202.20(c)(2)(vii)(A)). Indeed, 25 pages of code can be filled in many different ways, with either a minimal or a significant number of lines encompassing either function-critical or superfluous parts of the code. Developers consistently pointed out that, in practice, code is not quantified using pages, but rather files and "lines." A single computer program could therefore consist of one or more distinct files that contain one or more lines of code. Moreover, it may be difficult to determine which pages should be considered the "first" and "last" 25 pages of code, depending on how such code is stored on a computer or server. Redaction of trade secrets, furthermore, comes at the expense of an engineer's development time. Also, as one stakeholder remarked, no effective software so far exists to expedite or automate these tasks. Thus, transposing "lines" of codes to redacted "pages" burdens stakeholders, including start-ups, NGOs and multinational companies alike.

Some less experienced applicants said that they could avoid confusion about selecting code for deposit if the Copyright Office clarified the criteria. They also wondered how strictly the 25-page rule is enforced by Copyright Office examiners. They requested Copyright Office guidance to help less experienced applicants select appropriate code. Alternatively, they suggested that the Copyright Office redefine deposit requirements to enable applicants to share information about the substantial creative product related to their code without disclosing trade secrets. Reflecting on their numerous concerns with the deposit of code, some stakeholders questioned why a deposit is necessary for registration.

Options:

- Clarify deposit criteria, including rationale for 25 pages of code

[11] According to the Compendium II and the CFR, a certificate issued under the "rule of doubt" does not make any determination concerning the existence of copyrightable authorship in the deposited work. Normally, under Section 410(c) of the 1976 Act, a registration certificate constitutes "prima facie evidence of the validity of the copyright and of the facts stated in the certificate," and the claimant's ownership is among the facts stated in the certificate.

- Link to clarified guidelines on the registration website
- Revise deposit criteria to designate “lines” rather than “pages” of code
- Redefine deposit requirements to focus on the substantial creative product related to the code while protecting trade secrets

1.7.2. Protecting trade secrets

A concern among all respondents is the risk of disclosing trade secrets embedded in executable copies of deposited code. They pointed out that, once code is deposited with the Copyright Office for registration purposes, it becomes publicly available. Under current Copyright Office regulations, third parties may view deposited code on site. In addition to concerns about security procedures to protect trade secrets, one stakeholder mentioned that its CD deposit was lost at the Copyright Office after delivery. This stakeholder described the CD they sent to the Copyright Office as an executable copy that included trade secrets and they now wonder where that CD may have gone. The stakeholder wondered about the effectiveness of Copyright Office tracking and security systems, suggesting that administrative inefficiencies could result in the loss of trade secrets in the software. In principle, the Copyright Office protects trade secrets by withholding them from public access as undisclosed information but more than one stakeholder questioned whether Copyright Office security is adequate.

To accommodate stakeholders’ needs to protect trade secrets, the Copyright Office allows applicants to ‘block-out’ of portions of code containing this information. The deposit of unblocked or unredacted code would disclose trade secrets and effectively undermine one protection of the information under trade secret law. However, some stakeholders observed that the current blocking-out exceptions are unsatisfactory and that the guidelines for the number of “pages” blocked-out are arbitrary. In their view, these guidelines fail to consider the realities of coding or particular volumes of code. One lawyer in private practice stated that these requirements “should be updated to reflect the reality of modern code.”

Blocking-out trade secret portions of the deposited code creates an additional burden on stakeholders. One multinational stakeholder remarked that what makes registration costly and impractical for some of its software is the engineering time involved in redacting trade secrets from the deposit. Another stakeholder, a small nonprofit, remarked that the hours they spend on redacting the code – and, incidentally, searching for online tools that would assist in efficient, automated redaction – could otherwise be spent developing code that furthers the mission of the organization. Perhaps not coincidentally, the perception of imprecise guidelines and the need to protect trade secrets have caused a number of stakeholders to deposit “less sensitive areas” or “irrelevant parts” of the code.

Stakeholders offered possible solutions to the problems perceived in the deposit requirements, including safeguarding trade secrets:

- **Deposit repository**. One suggestion is to create a repository to securely store and save deposits that contain trade secrets. Such a repository would prevent the public, including possible infringers, from gaining access to executable copies. Such a repository could be financed through an extra charge to applicants. A less technically burdensome alternative would be to allow registrants to include lines of code that the Copyright Office guarantees will not be made public, with clarity around security procedures within the Office.

- **Secure test rule**. Respondents' reactions to a proposed "secure test rule" to help protect trade secrets varied across industries. Some stakeholders welcomed such a rule, because such a rule would allow the claimant to "walk through the code with the examiner" without any deposit. Other stakeholders expressed doubt about the utility of such rule, believing that it would be more time-consuming and expensive than regular registration; these stakeholders anticipated that such a rule would necessarily involve more lawyer time throughout the registration process and perhaps an actual in-person trip to the Copyright Office in Washington.

- **English-language statement**. Stakeholders across industries categorically rejected the alternative of depositing a brief, non-confidential English-language statement to the Copyright Office in lieu of code. Some respondents thought that such a description would undermine the examiner's determination of originality in a computer program because one description could fit vastly different code.

- **Forgo the deposit of code all together**. One prominent multinational software company questioned the need to deposit any sample source code with the Copyright Office. This respondent cited the significant administrative burden of ensuring that the deposit appropriately represents the product without disclosing trade secrets vastly outweighed the value of the few situations in which such disclosure would be useful to future examiners or to future infringement actions. This respondent gave as two examples registration of font code or algorithms.

Despite the cost of compliance with the deposit requirement, most respondents prefer to *maintain* the deposit rules for software except where they (i) unanimously asked that the Copyright Office update "pages" to "lines" of code, and (ii) generally requested eliminating third-party access to deposited source code.

Options:

- Issue a call to programmers to develop open-source, automated tools to aid in redacting code; host these tools (or links to the tools) on the Copyright Office registration page
- Update deposit rules for software, replacing "pages" with "lines" of code
- Bar third-party access to deposited source code

1.8. Public communication about the value of registration

Many respondents agreed on a need for the Copyright Office to improve its outreach to the software community to relay the importance of registration, its benefits, and sometimes even its existence. Interviews with non-legal professionals – especially developers and engineers – revealed that they do not always understand the scope and the benefits of registering their software. Such lack of knowledge is more noticeable among small companies and low-budget organizations than among larger businesses that regularly implement streamlined registration processes by coordinating the work of their engineers with in-house and outside counsel.

A few attorneys emphasized that they must repeatedly explain to their clients the need for and benefits of copyright registration. Our stakeholder indicated that this is especially true for attorneys

who work with smaller companies and nonprofits. Across industries, counsel indicated that their clients do not register "as often as they should," but did not describe specific solutions to improve this situation. Similarly, interviews with developers and engineers demonstrated their general awareness of information related to registration on the Copyright Office website, but most said that their attorneys were their primary source for information about registration. Without their attorneys promoting registration, many stakeholders said that they would be less inclined to register.

Respondents were generally aware that the Copyright Office website provides information on what is protected by copyright and examples of copyrighted works. Our review of the website shows that when a user reaches the registration portal, which distinguishes literary works from "other digital contents," the user must then click on "other digital contents" to a new page to learn that software products are registered as literary works.

Our review of the website confirmed complaints from some respondents about the dearth of information on the site detailing why software developers should register their work. On any of the type-of-work pages, the user can access "General FAQs about Copyright" (accessible at https://www.copyright.gov/help/faq/index.html). Among those FAQs is a question addressing the reasons to register a work, yet, it may be more persuasive to potential registrants to dedicate a single webpage fully describing, in lay terms, the value of registration for works generally with supplemental attention to software. The webpage could be accessed through a highly visible link on the registration home page, rather than as a short answer among dozens of FAQs.

In the view of most respondents, the Copyright Office website could provide more instructive information about the value of software registration. Respondents suggested that the Office highlight the benefits of software registration in a simple and educational way.

Options:

- Develop a highly visible description of the value of registration with details linked on the registration homepage
- Target information about the value of registration to specific groups that are less well-versed in the value of software

1.9. Records management

Several stakeholders suggested that it would be beneficial to give applicants access to a copy of the application and deposit following online registration. Some also mentioned that the absence of built-in printing functionality at the end of the eCO registration process makes their review of an application difficult, as the summary becomes truncated when turned into PDF format. This is especially problematic in instances where a registrant seeks to review the application with a lawyer or other third party prior to submission.

Some stakeholders mentioned the difficulty of searching existing copyrights. Registrants are aware of the cost to the Copyright Office of enhancing electronic service but believe the investment is worth it. One major industry stakeholder suggested that the Copyright Office should establish a paid means of access to the Copyright Office's data; while this option may help finance upgrades to the system and enhance results, the cost could prove burdensome to stakeholders

with more limited budgets. If implemented, the Copyright Office would want to offer access to the data at no or lower cost to more cost-constrained stakeholders.

Some developers erroneously complained that executable versions of software are not retained beyond five years and asked that the Copyright Office consider extending the retention period. In fact, the Copyright Office retains deposits of executable copies of unpublished computer programs in a storage facility for the full term of copyright. In the event that the applicant submits a commercially packaged disc, the published work is offered to the Library of Congress. If the published work is not selected by the Library or if the applicant does not submit a commercially packaged product, the executable copy of the program may be retained in the Office's storage facility for up to 20 years. All stakeholders described access to executable versions as a valuable resource in instances of infringement. For ease of access, a digital, searchable repository for software deposit would make such requests more feasible.

Options:

- Add a printing function to eCO registration, including access to a full copy of the completed application and deposit
- Enhance digital access to copyright information
- Consider implementing a small charge for access to deposited code (but protect and exclude trade secrets), which could also help cover the cost of enhancements to the Copyright Office digital intake and records search functions

Table 2: Summary of Options

Summary of Options

1.2 Registering derivative versions and frequency of updates

- Clarify rules for registration of derivative works, including resolution of differences in language between the paper TX form and eCO platform
- Develop an automated means to register different versions of a single piece of software
- Improve the eCO template to accommodate group registration and streamline updates for derivative works
- Develop an open API that would potentially enable automated registration through open-source developer portals

1.3 Definition of Publication

- Further clarify in the Compendium the definition of publication for cloud-based software; enhance registration materials to guide applicants on the application of the definition to cloud-based software. (See Section 3 for a prototype registration system with built-in, automated guidelines for applicants.)

1.4 Authorship for Open-Source Code

- Revise the eCO application to enable applicants to enter information about the contributions of multiple authors, as is possible with Form TX
- Offer online chat options with Copyright Examiners who can guide new applicants on registering software, including guidance on registering open-source code with multiple authors

1.5 Unit of Publication Rule

- If the rules for bundled electronic files and documents pertaining to a single program cannot be aligned with those applying to physical bundles (*Compendium,* 3d, §1107.1), clarify for cloud-based stakeholders the obstacles in applying the unit of publication rule to electronic files

1.6 Multi-platform software registration

- Develop new registration procedures for multi-platform software that enables applicants to file a single application that includes not only the claim for the audiovisual material and the underlying computer program, but also adaptations for multiple platforms
- Include the option of a group registration format for multi-platform software

1.7.1 Deposit

- Clarify deposit criteria, including the rationale for 25 first and last pages of code
- Provide a link to the clarified guidelines on the registration website
- Revise deposit criteria to designate “lines” rather than “pages” of code

- Redefine deposit requirements to focus on the substantial creative product related to the code while protecting trade secrets in underlying object code

1.7.2 Protecting Trade Secrets

- Issue a call to programmers to develop open-source, automated tools to aid in redacting code; host these tools (or links to the tools) on the Copyright Office registration page
- Update deposit rules for software, replacing “pages” with “lines” of code
- Bar third-party access to deposited source code

1.8 Public communication about the value of registration

- Develop a highly visible description of the value of registration with details linked on the registration homepage
- Target information about the value of registration to specific groups that are less well-versed on the value of software

1.9 Records management

- Add a printing function to eCO registration, including access to a full copy of the completed application and deposit
- Enhance digital access to copyright records
- Consider implementing a small charge for access to deposited code (but not to trade secrets), which could help cover the cost of enhancements to the Copyright Office digital intake and records search functions

2. Next-generation software registration in an era of cloud computing

2.1. What is cloud computing software?

Software-based companies are rapidly moving from the traditional software distribution model of "CDs in boxes" to a cloud-based, software-as-a-service ("SaaS") model. In the case of consumer software, this implies a shift from individual users obtaining, installing, and using software that runs solely on the user's own machine to the user accessing a remote service on a client-server. From the viewpoint of copyright law's mechanics, the client-server model differs from more traditional methods of software distribution, since the software that provides the service exists not on the user's own device, but on the software provider's server (or the cloud).

Cloud-computing software can operate entirely or partially in the cloud, depending on the company's business model. The use and accessibility of such software also varies: Increasing numbers of companies use the subscription, or SaaS, model, where users pay a monthly or annual fee for access to the service;[12] others permit free use through access to the client-facing product or platform, which is housed in the cloud (for example, a social media platform or search engine platform). These changes in methods of software distribution have produced a fundamental shift in how software developers view copyright registration.

2.2. How the shift to cloud computing software affects copyright registration

Software enjoys the benefits provided by copyright registration, including proof of ownership and access to statutory damages and attorney fees. Yet, software developers and their counsel must weigh the benefit gained from copyright registration against the time, effort, and risk attached to the application process. Because cloud-hosted code reduces infringement concerns—for an infringer to copy cloud-based service, it must physically or electronically break into the premises where the server is situated—it also decreases incentives to software copyright registration. The next section explores how the shift to cloud computing affects developers' rationales for software copyright registration.

2.2.1. Declining risk of infringement

Software that operates either entirely or partially in the cloud while delivering its functionality to the user is accessible by the user as a provided service. No part of the software in the cloud is transferred or copied to the user's computer. To make a copy, a user would have to access to the server containing the software itself, which is generally under the company's control and only accessible to employees of the company. Access would necessarily be unauthorized and subject to criminal sanctions. The shift toward cloud computing thus not only reduces the risk of infringement and hence the need to register software, but also reduces the legal need for registration. It is no surprise, then, that some developers and companies reported that they do not need copyright registration for their software, as there is only small chance that they will benefit procedurally. On the other hand, one attorney respondent pointed out that it is very difficult to obtain criminal charges against copyright infringement. Prosecutors often do not view copyright

[12] Computer Economics, *Technology Trends 2017*, finds that "a majority (60%) of responding companies now report adopting at least some SaaS," http://www.computereconomics.com/article.cfm?id=2253, accessed June 16, 2017.

infringement cases as “attractive” and they are reluctant to pursue these cases without the legal documentation that occurs with formal registration. Therefore, according to this respondent, software owners are in fact better protected when they have a registration.

2.2.2. The impact on registration

With traditional resident software, new updates are at risk of infringement at the time of market release and distribution. Although software developers cannot reduce the risk of unauthorized reproduction of copies after release, they can buttress their litigation position by registering specific major updates ahead of public release and securing immediate access to courts and enhanced remedies where infringement occurs. Under this traditional regime, software developers rely on registration to protect their control over each update they release.

Unlike resident software, which exists in static form as downloads on servers and personal devices, cloud-based software exists as a single “live” version, where developers can update the code in real-time with both major and minor changes. One developer said that updates are automatically installed into his organization’s pre-existing software, and are thereby available to users worldwide at the moment of the update. As a concrete example, consider the Google.com website. There is no need to download anything in order to use the Google search engine, as it is accessible through any web browser. Google, the company, may make several changes a day to the code for Google.com, and the changes become instantly available to the public as soon as they are released. Interviews with cloud-based developers consistently revealed the open question of how and whether developers should handle live, frequent updates and which update should they register. Developers pointed out the ambiguity in the Copyright Office rule about registering updates and derivative works, asking when such works should be registered. They are inclined to perceive the moment-to-moment updates to their cloud-based works as incompatible with the Copyright Office advice to register only “major updates” as derivative works.

If copyright registration mattered to companies that distribute their software as a service from the cloud, the feature of daily updates might complicate their copyright practices. Some stakeholders observed that cloud computing makes copyright registration obsolete for cloud-based software, while some continue to register following their long-standing practices.

2.2.3. Source code deposit and trade secrets

Across the software industry, both traditional resident and cloud-based developers agree that the deposit requirement for source code is in need of reform. Both groups voiced concern with protecting trade secrets when the deposit of source code enters an openly accessible, searchable database. This concern was especially resonant for cloud software developers who pointed out that their source code is stored on an internal server, safe from competitors and potential bad actors and the trend among cloud-based software developers is to rely on the security of their own systems in place of formal registration.

2.2.4. Cloud-based software registration needs

The decline in infringement threats and the relative security of trade secrets does not entirely undermine the attraction of registration for cloud-based products. Not only do some developers continue their regular practice of registration, but they recognize that registration enables a compelling proof of ownership. They may rely on the registration certificate, for example, in a

merger and acquisition deal, international business transactions, or in scaling their product for other markets. Stakeholders also noted that the robust system for copyright registration in the U.S. can be influential in other countries.

Registration practices are inconsistent among partially cloud-based software companies. Some companies register the back-end part of the software as unpublished work, separated from the client-facing part. Others register only the client-facing part of the software, as they see no necessity to register work housed exclusively on their own servers.

The prospect of statutory damages and attorney's fees continues to encourage registration. Respondents who represented larger software companies described these factors as enhancing discussion and settlement among parties and as helping to prevent infringement. These respondents pointed out that the fact that source code is stored on an internal server, and thus protected under other laws, does not change the need for statutory remedies and attorney fees. They described copyright infringement as not typically rising to the level of criminal offense, making infringement easier to resolve outside of court.

2.2.5. Options to encourage registration among cloud developers

- **Update Circular 61**

Our findings point to the need to revise Copyright Office Circular 61, "Copyright Registration for Computer Programs,"[13] as a necessary first step in educating cloud developers about the value of registration. While the current version of the circular addresses computer programs broadly, it does not fully encompass the needs of cloud software, particularly in relation to issues of authorship, publication date, updates for derivative works, and deposit of code. Indeed, the current version of Circular 61 does not directly recognize cloud software anywhere in its user guidelines,[14] making it difficult for cloud-based applicants to navigate registration accurately and effectively.

In interviews, independent developers, as well as engineers and business leaders for smaller companies and nonprofits, consistently revealed that they find the Circular guidelines difficult for non-lawyers to understand. They further pointed out that they may not engage or have access to lawyers for registration. They described the language in Circular 61 as using legal terms and jargon, including statutory language, without adequate translation into lay terms. Such issues are compounded by ambiguities in the guidelines for cloud-based and open-source software. Indeed, a lawyer representing a major cloud software developer was considering registering the database that supports its large crowd-sourced information platform but found the guidelines abstract and ambiguous; thus, he decided not to register the database at all and relies instead on contractual protections with the company's users. Even in-house counsel for large software companies agree that the Copyright Office should redesign the application guidelines and platform from the perspective of less experienced applicants, both lawyers and engineers.

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[13] *Circular 61*, Copyright Registration for Computer Programs, 61.0812, https://www.copyright.gov/circs/circ61.pdf. Note that the Copyright Office updated its Circular 61 in September 2017, shortly after the completion of this research project. Although the updated version is easier to follow, it still does not single out cloud software specifically or acknowledge the needs of cloud developers.

[14] *Ibid.*

- **Improve industry understanding about the direct value of registration**

Although many cloud-based stakeholders questioned the value the registration, arguing that cloud software is less subject to infringement, interviews revealed that larger cloud-based companies are likely to engage in wide-ranging commercial transactions, both domestically and abroad. Similarly, successful start-ups that run software on internal or open-source servers can benefit from registration when they expand their products into new markets, or develop partnerships with organizations that rely on their software. With fairly simple revisions to Circular 61, the Copyright Office website, and the registration portal, the Copyright Office can better inform developers about the value of registration.

- **Improve industry understanding of the societal value of registration**

The Copyright Office describes its mission as administering "the Nation's copyright laws for the advancement of the public good" (see "Mission Statement of the U.S. Copyright Office," https://www.copyright.gov/about/), yet some respondents wondered about how the registration of their works serves the public good. Information added to Circular 61 and to the registration page could better inform industry registrants about the societal value of software registration, thereby further encouraging registration.[15]

The Copyright Office may further encourage cloud developers to register their works by:

- Revising the eCO platform as a low-friction, automated platform that more easily enables cloud software developers to register their works (see Section 3, "Automated Prototype Platform").
- Developing an open API that enables software companies and open-source platforms to develop low-friction portals to enable automated registration.
- Revising the current eCO registration questionnaire to accommodate cloud software specifically.
- Revising registration guidelines for such issues as: ambiguities in registering frequent updates and derivative works and in documenting multiple, anonymous authors for works built from open-source code
- Improving security and long-term access to the deposit and executable copies. Such improvements include a clear policy or regulation on what is stored, where it is stored, how and for how long is it stored, and a redress mechanism for loss of deposit or any damages.
- Making more public the rationale, present on the Copyright Office website, for the value of copyright generally and registration specifically. Simple improvements to the placement of such language on the Copyright Office website and registration page would help developers and the public better appreciate the value of registration.

[15] Note that the Copyright Office has recently updated Circular 61 (September 2017) and developed new public materials documenting the value of copyright registration (email correspondence from Copyright Office to Paul Goldstein, August 1, 2017). These are important steps in fostering public understanding about the value and methods of copyright. The suggestions provided in this report continue to offer guidance on further improvements.

3. Prototype for automated registration platform

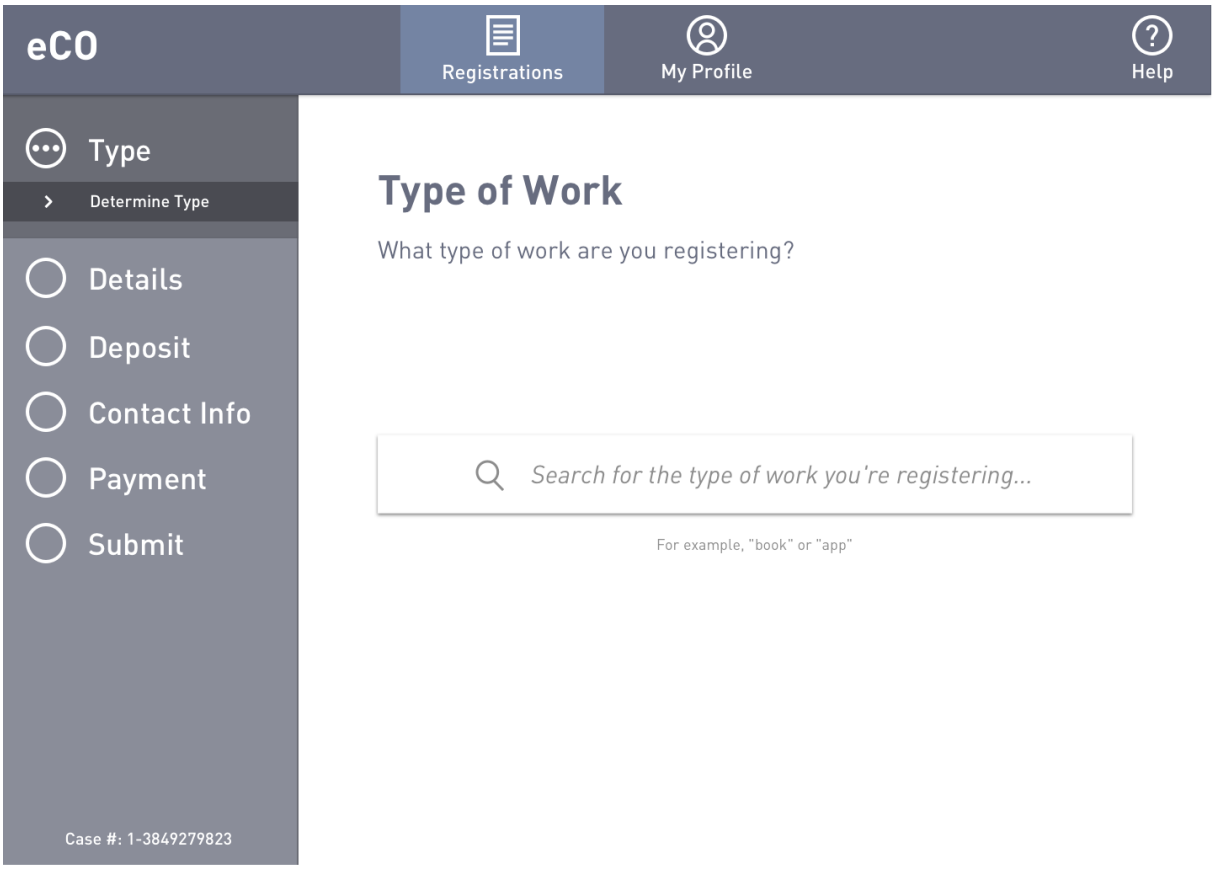
This prototype for a new eCO platform is modeled on findings from this report and responds not only to applicants' needs but also to the evident willingness of the USCO to consider suggestions for a next-generation, automated registration system. While it is not complete, it does offer a streamlined, user-friendly interface that may help to guide the Copyright Office in revising its current eCO registration tool. The 11 mock-up pages feature a registration portal that alleviates some of the problems and ambiguities in the current eCO interface, including:

- An interface adapted uniquely to computer programs
- Clean graphics
- Alignment with the TX form
- Streamlined, click-through intake fields with menu tracking
- Automated case tracking, including an automated case reference number
- Clickable help tool – "Help Me Decide" – adapted to each intake question
- Guidance for protecting trade secrets in the deposit
- Drag-and-drop upload feature for the deposit
- A print function that enables the applicant to review the application in full before submitting it.

The prototype requires additional work to develop its full potential with particular attention to the "Help Me Decide" tool that helps guide software developers and their attorneys more easily through otherwise ambiguous or conflicting guidelines.

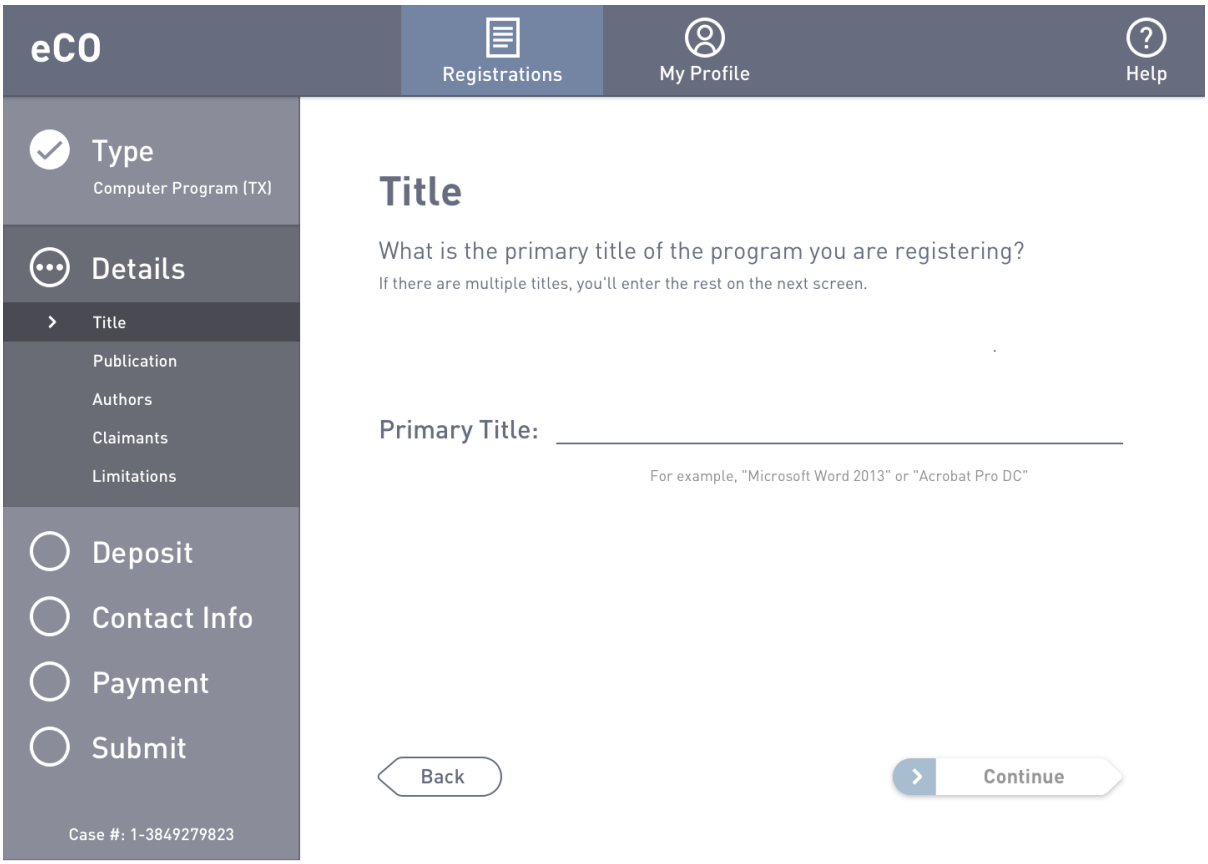
Among the additional features that could be added to the new eCO platform are clear guidelines for derivative works and the ability for applicants to adapt a single, master registration for multi-platform works.

Prototype page 1: Type of Work

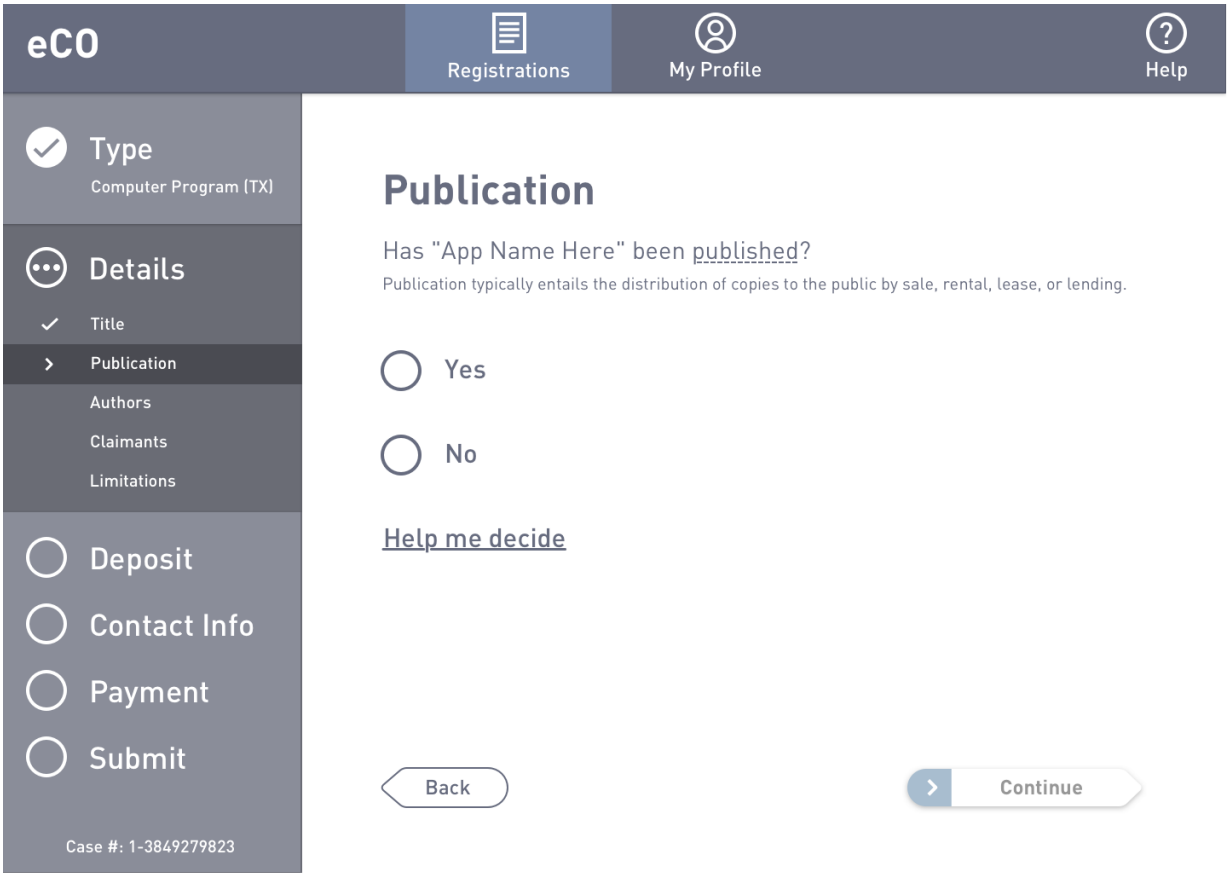


This page serves as the intake page for any work. The type of work entered will then link to a click-through flow chart adapted specifically to each type of copyrighted work. Here, of course, we focus on computer programs.

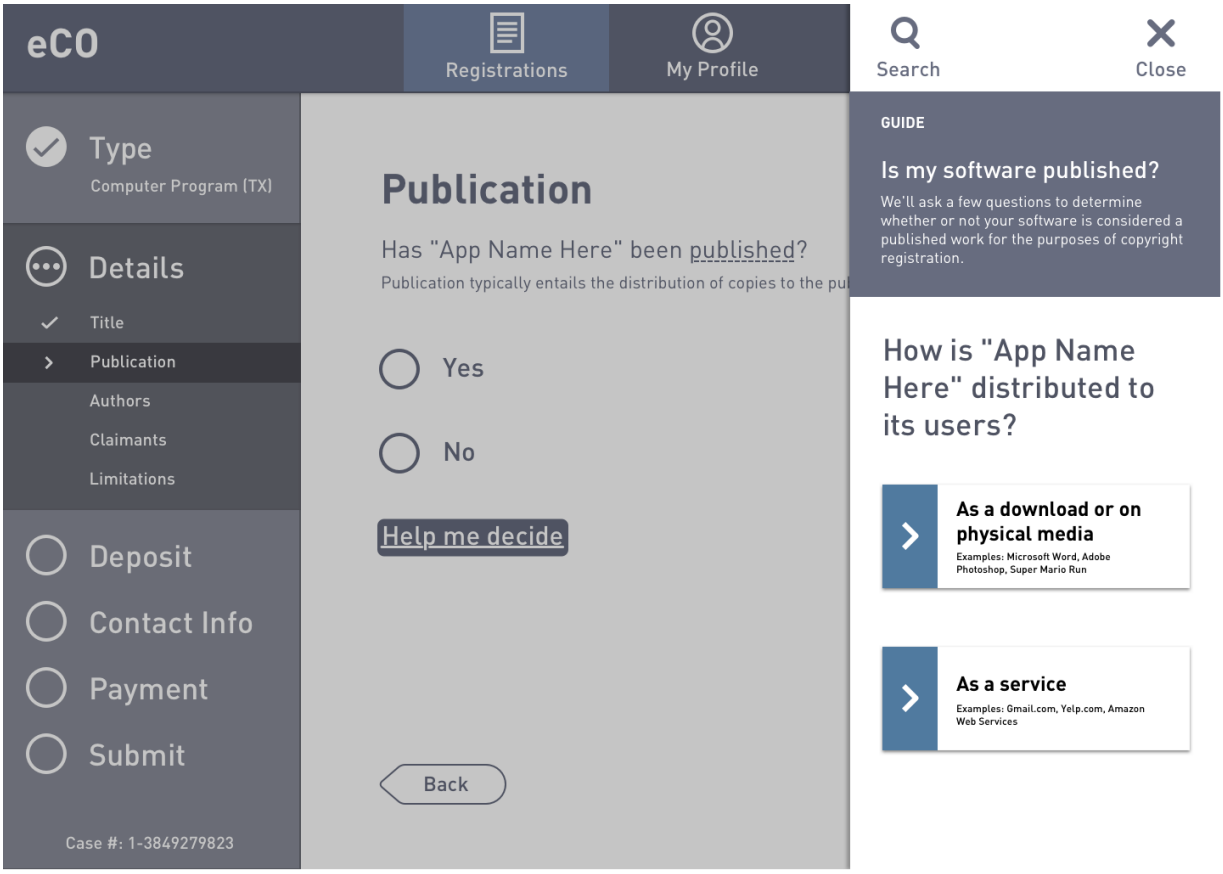
Prototype page 2: Title of computer program



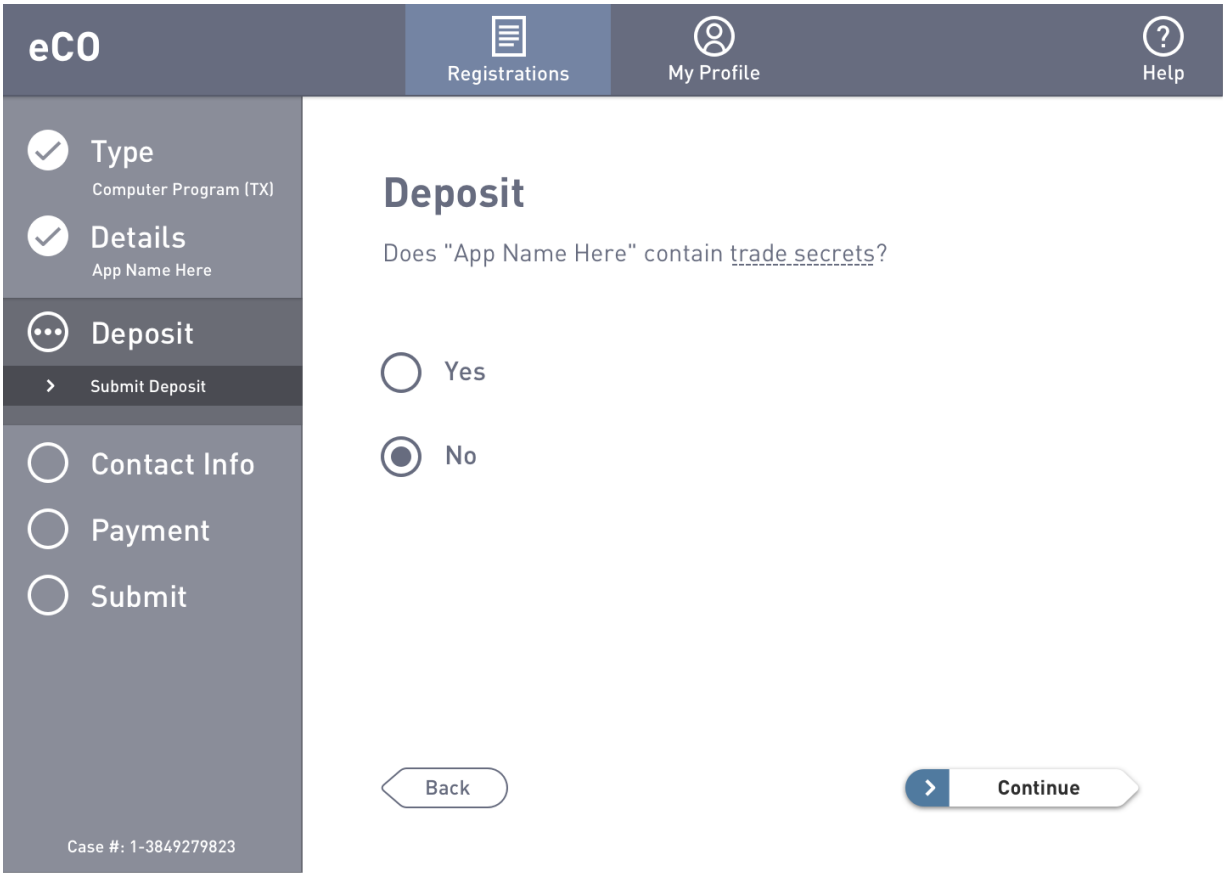
Prototype page 3: Publication



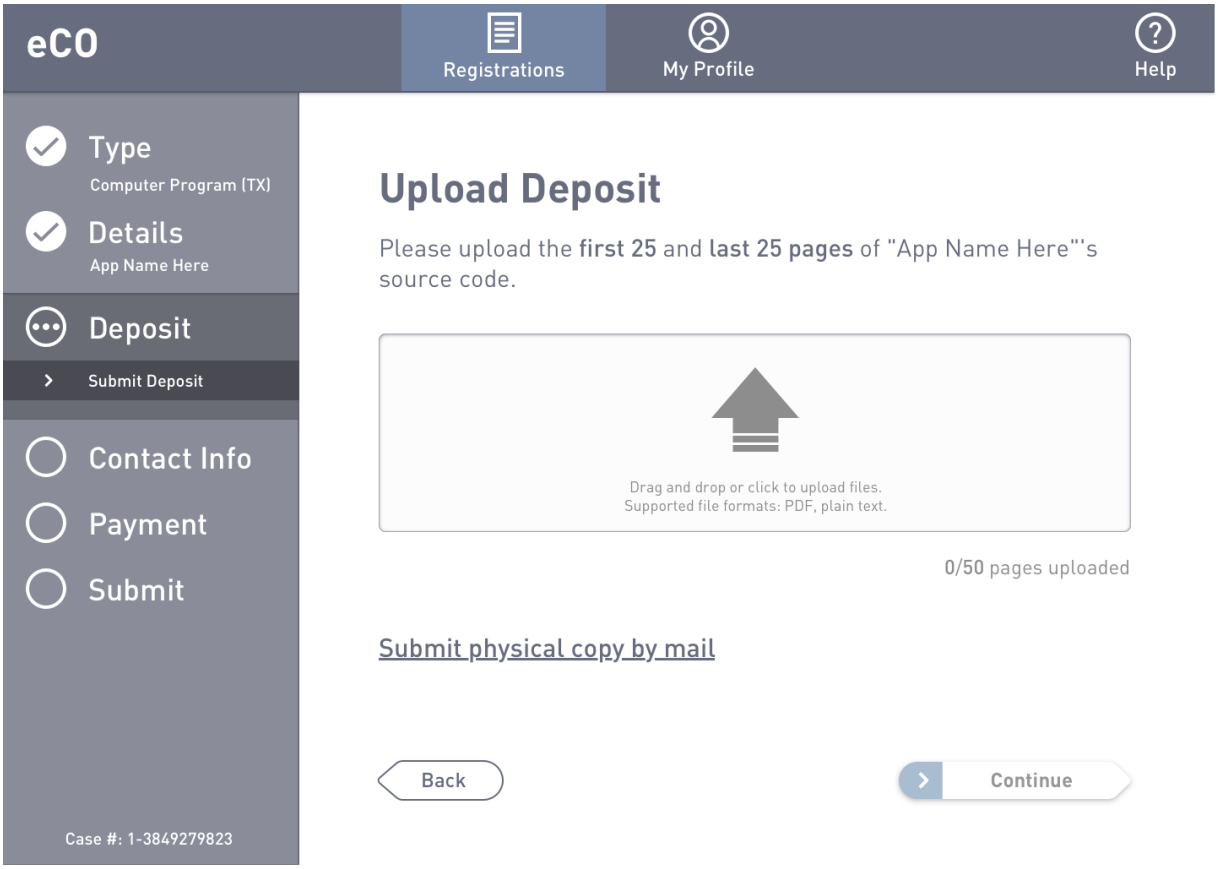
Prototype page 4: “Help me decide” help tool



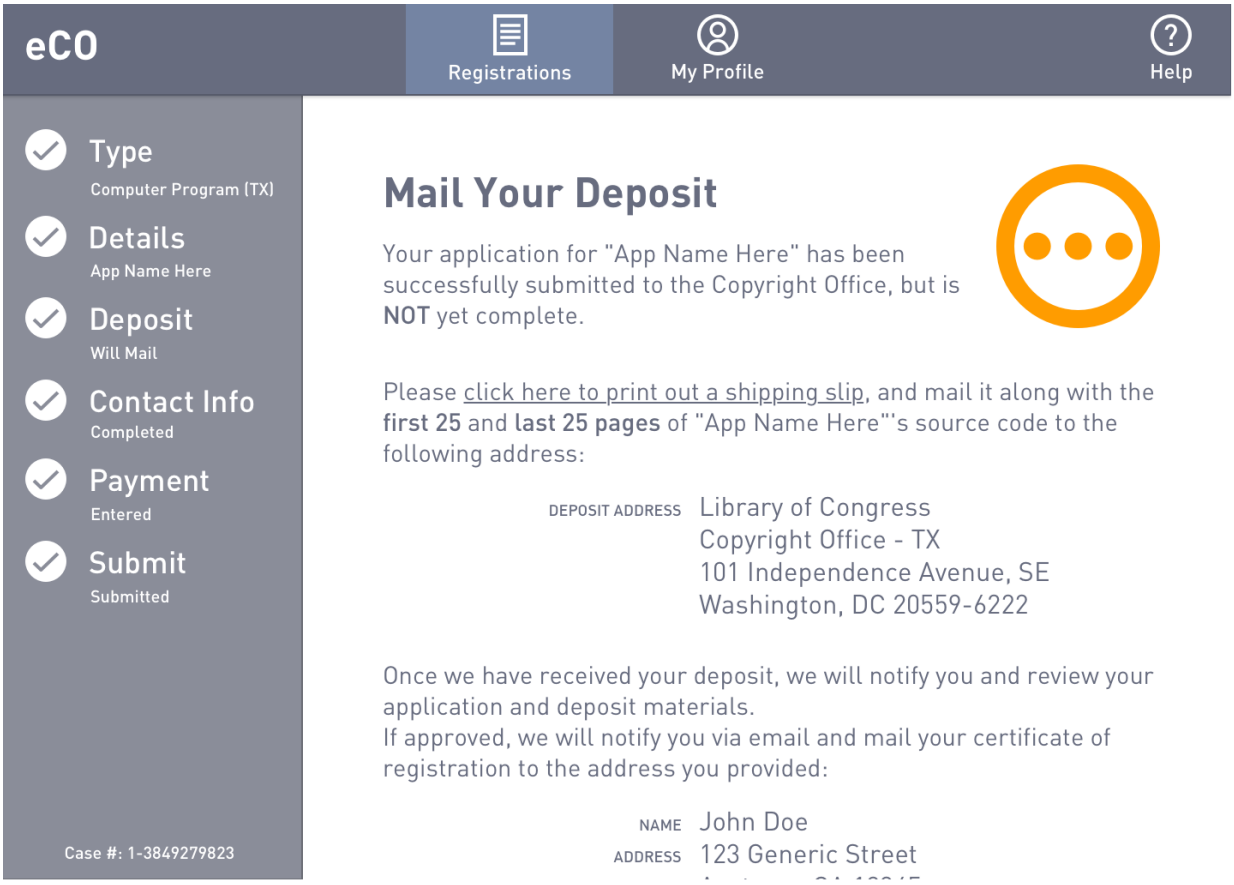
Prototype page 5: Deposit and indication of trade secrets



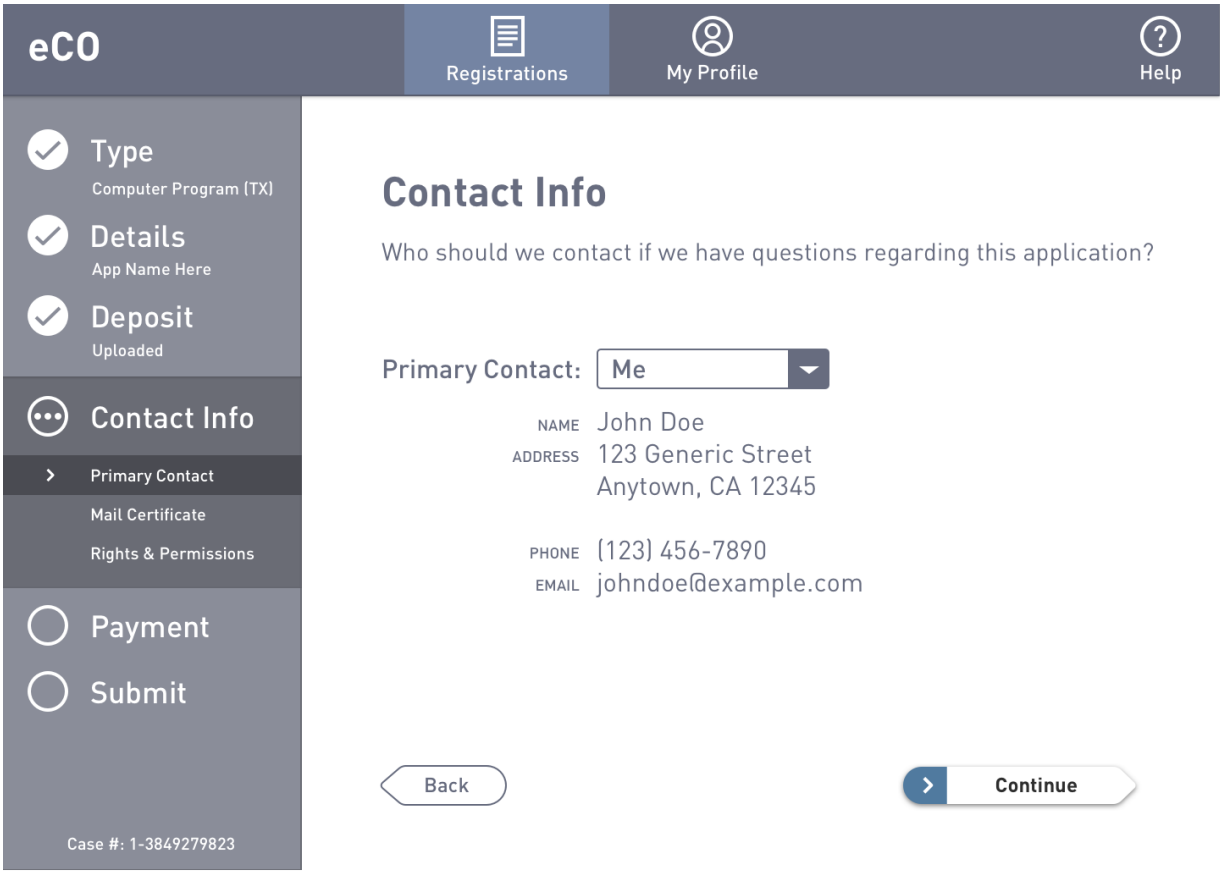
Prototype page 6: Drag-and-drop upload for deposit



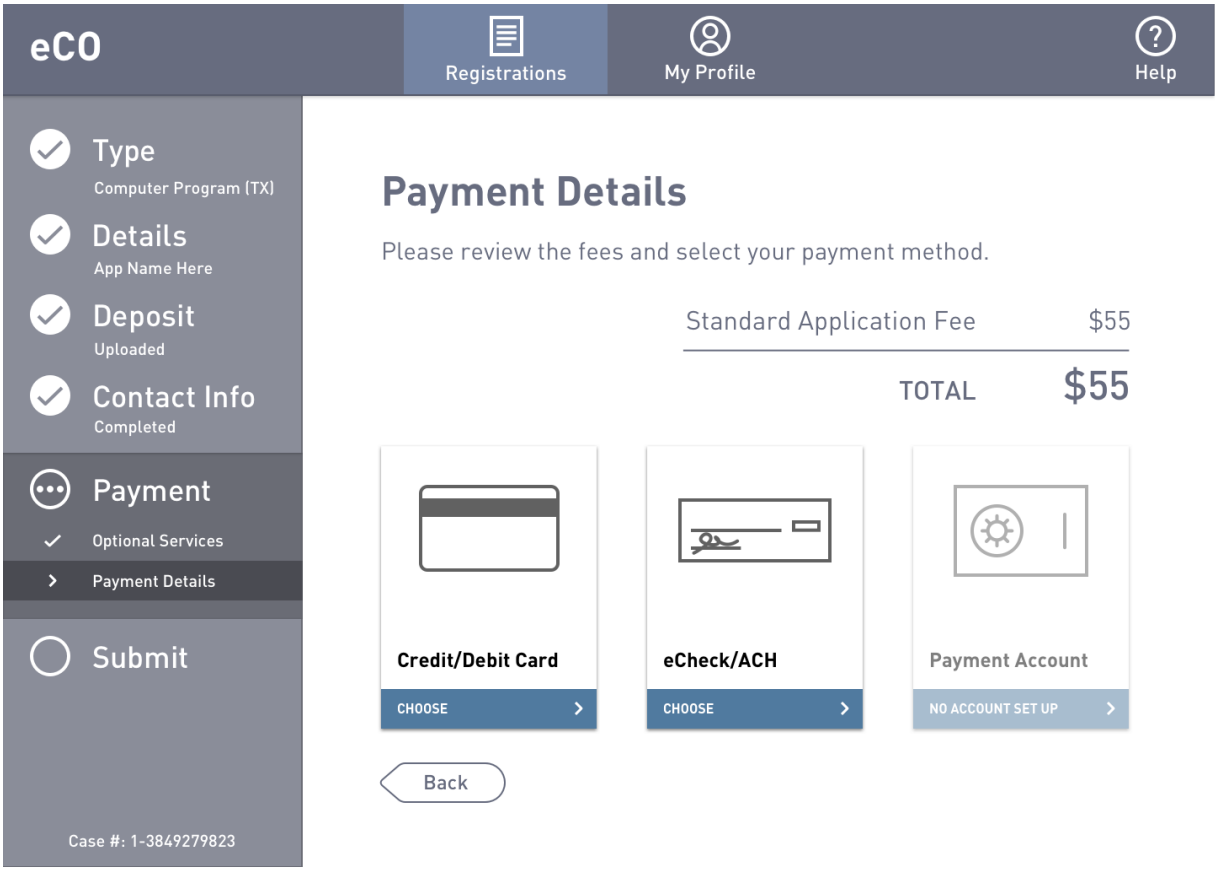
Prototype page 7: Choice to mail deposit



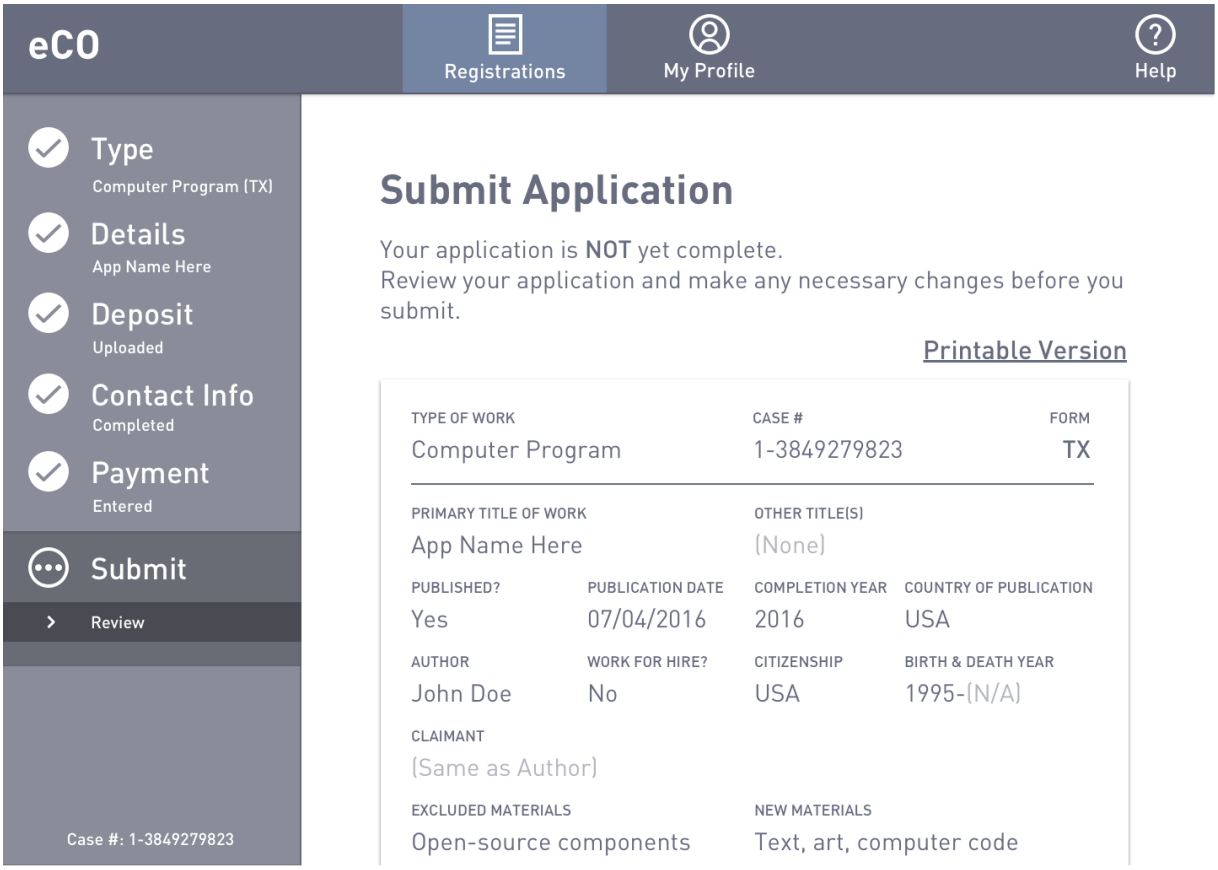
Prototype page 8: Applicant's contact information



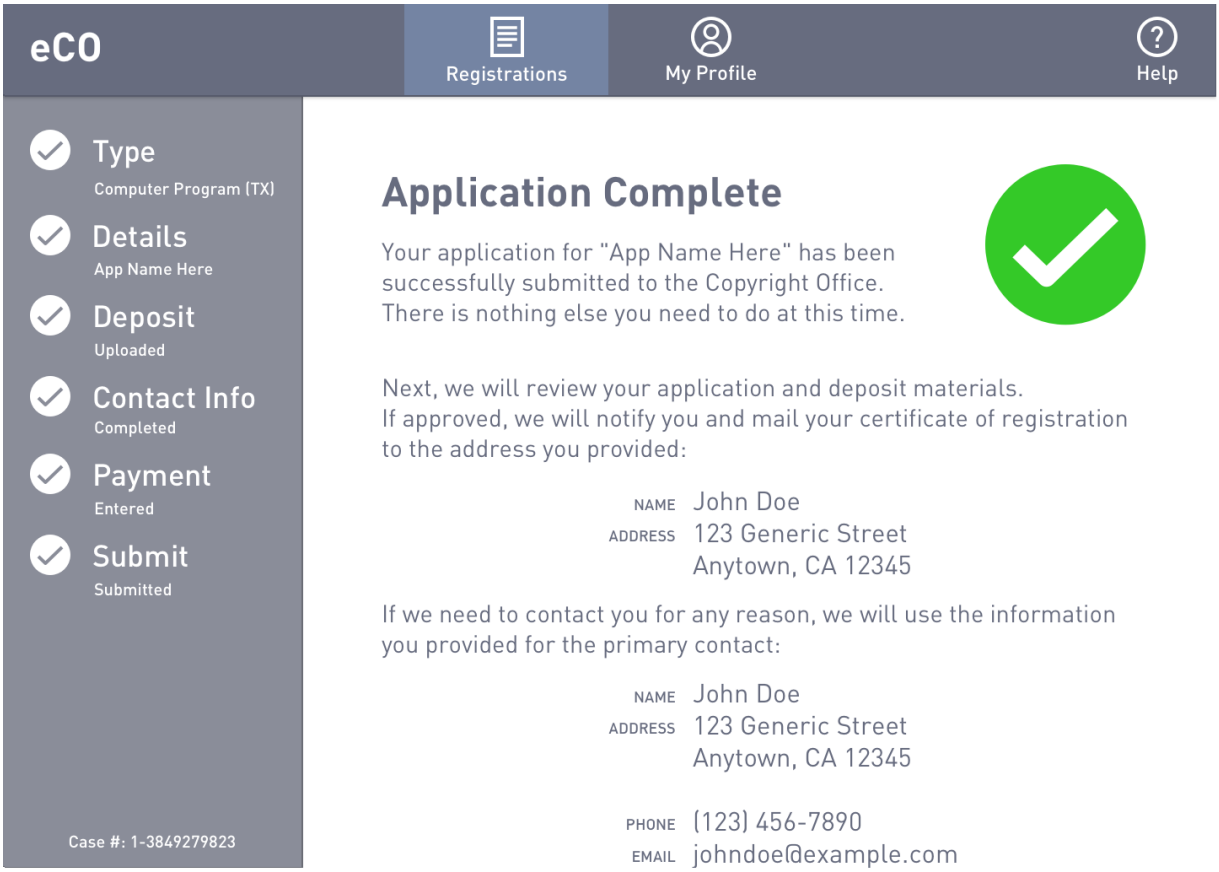
Prototype page 9: Payment



Prototype page 10: Submit application



Prototype page 11: Application is complete



Conclusion

This report identifies alternative approaches and improvements to registration for computer software which may also enhance industry copyright practices beyond registration. It contributes to ongoing efforts by Copyright Office aimed at improving guidelines and the flow of information about the value of registration for potential software industry applicants. This report also provides a vision for an improved eCO registration tool which alleviates some of the friction points inherent in the current platform. Finally, it condenses findings into a draft Notice of Inquiry (see Appendix 2) aimed at helping the Copyright Office further align its practices and tools concerning software registration with the needs of the digital age.

Appendix 1: List of Stakeholder Industries

- Attorneys in private practice who handle copyright registrations on behalf of software developers. These attorneys were chosen as representatives for large law firms, small firms, and solo practices.

- In-house corporate counsel and paralegals for startup and large technology companies. Some served as the intermediaries between the engineers and the outside counsel of the firm handling the application.

- Founders and engineers at start-up platforms, large open-source repositories, and non-profit developers.

- Independent developers.

- Copyright Office representatives, including administrative officials and examiners.

Appendix 2: Draft Notice Of Inquiry

LIBRARY OF CONGRESS

U.S. Copyright Office

[Docket No. 2017-__]

Copyright Registration of Computer Programs

Study: Notice and Request for Public Comment

AGENCY: U.S. Copyright Office, Library of Congress.

ACTION: Notice of inquiry.

SUMMARY: The U.S. Copyright Office is undertaking a study to review the operation and impact of copyright registration for computer programs.

The topics of public inquiry include whether current rules and procedures for copyright registration of computer software advance or hinder innovation and creativity in the design and distribution of computer programs, and how application, examination, and registration practices for computer software could be improved. This is a highly specific study not intended to examine or address more general questions about copyright protection for computer software.

DATES: Written comments must be received no later than_____ at 11:59 p.m. Eastern Time. Written reply comments must be received no later than _____ at 11:59 p.m. Eastern Time. After written comments are received, the Office will, by separate notice, announce one or more public meetings to take place in the future.

ADDRESSES: All comments must be submitted electronically. Specific instructions for submitting comments will be posted on the Copyright Office website at http://www.copyright.gov/_____ on or before_____. To meet accessibility standards, all comments must be provided in a single file not to exceed six megabytes (MB) in one of the following formats:
Portable Document File (PDF) format containing searchable, accessible text (not an image); Microsoft Word; WordPerfect; Rich Text Format (RTF); or ASCII text file format (not a scanned document). Both the web form and face of the uploaded comments must include the name of the submitter and any organization the submitter represents. The Office will post all comments publicly in the form that they are received. If electronic submission of comments is not feasible, please contact the Office using the contact information below for special instructions.

FOR FURTHER INFORMATION CONTACT:
Catherine Rowland, Senior Advisor
to the Register of Copyrights, crowland@loc.gov;
or Erik Bertin, Deputy Director of Registration
Policy and Practice, ebertin@loc.gov.
Each can be reached by telephone at
(202) 707–8350.

SUPPLEMENTARY INFORMATION:

Regulatory Framework: 37 CFR 202.20 (c) (2) (vii), Computer programs and databases embodied in machine-readable copies other than CD-ROM format. *[USCO adds brief summary]*

I. **BACKGROUND**:

Development of the software registration process and eCO platform as it pertains to software *[USCO adds]*

Developments in Case Law: *[USCO adds relevant case law]*

Recent improvements to the registration platform pertaining to software: *[USCO adds]*

II. **SUBJECTS OF INQUIRY**

On the basis of preliminary findings of a Stanford Law School Policy Lab Report, "Revising the Requirements for Software Registration," the Office seeks public comment on the following topics. A party choosing to respond to this Notice of Inquiry need not address every subject, but the Office requests that responding parties clearly identify and separately address each subject for which a response is submitted.

1. How do rapid development cycles for software affect the need for registration updates?

The software industry is experiencing a shift to shorter development cycles, in part as a result of the ability to deploy "software as service" via the cloud. The creation of derivative works based on existing software is no longer limited to staged, hard-copy releases—2.0, 2.1, 2.2., and the like—and updates can occur on a weekly or even daily basis. These rapid development cycles have produced concern among industry stakeholders about the frequency with which they should register their software updates with the Copyright Office. Developers and stakeholders across the industry have voiced concern about the lack of clarity in the Office's guidelines for registering derivative works and about the impracticality of registering every update.

2. What registration challenges are associated with open-source code?

Much software today is based on pre-existing open-source code, which, in turn, may have been developed by hundreds or even thousands of contributors. These contributors may be based anywhere in the world, and many of them may be identifiable only through user names. Adopting and modifying open-source code is now a commonly accepted industry practice, and it is not unusual for dozens of open-source projects to be incorporated in a single work. The often patchwork quality of the resulting product raises the question of how these preexisting works should be identified in the registration application, since identifying all of the rights holders of open-source code and documenting specific authorship can be overly burdensome to applicants, if possible at all.

3. Should cloud-based software be considered published within the meaning of the term "publication" in the Copyright Act?

The question whether software has been published, and—if so, when—is important for several reasons. Yet the statutory definition of publication—"the distribution of copies or phonorecords of

a work to the public by sale or other transfer of ownership, or by rental, lease, or lending" (17 U.S.C. § 101)—does not map perfectly onto the contemporary realities of software distribution. In the case of cloud computing, computer programs can be accessed by or disseminated to the public without the physical distribution of copies, with no more than a single copy under the control of the copyright owner and inaccessible to users. Thus, applicants face the challenge of interpreting the statute and the Copyright Office's guidelines to evaluate whether their claim to copyright involves a published work when the work is publicly accessible but copies are not physically distributed.

4. How useful is the unit of publication rule as applied to a computer program bundled with related documentation?

Traditionally, computer software has been covered by the unit of publication rule, and could be registered through a single application if it consists of "a package containing a computer program and a user's manual" (*Compendium, 3d,* § 1107.1). The Office has recently rejected single applications combining electronic files and documentation bundled together as a single unit and published on the same date via the cloud. Some stakeholders say this is neither efficient for the Office nor cost-effective for them and could be resolved by applying the unit of publication rule to cloud-based software in which electronic files and documentation are bundled together.

5. What challenges exist for developers seeking to register software developed in multiple versions to operate for the purpose of compatibility with different platforms? Should multi-platform software be registered separately for each platform?

The Copyright Office treats each version of a computer program that has been designed for different platforms as a separate work and requires one registration per work. However, it is common for developers to make versions of software that function across various platforms. Although many or even most components may be shared across the different versions, each version will usually also contain code specific to the platform for which it is designed. Furthermore, these versions are not always released across all platforms simultaneously, complicating the issue of determining publication date. It is currently unclear how best to handle this design and production phenomenon. A single registration may not adequately cover the platform-specific components, while filing an application for each platform may be unnecessarily burdensome. Stakeholders have expressed their desire for a "group" registration that could cover several closely related works, or the ability to specify multiple platforms within a single registration.

6. Are current deposit rules appropriate for today's software?

Copyright Office rules currently require deposit of 25 first and last pages of source code. Code, however, is not written not in a page-format, but in "lines". Therefore, a single computer program may consist of one or more distinct files that contain one or more lines of code. In order to protect trade secrets included in the code, the Copyright Office allows applicants to manually block-out, or redact, parts of code including trade secrets from the deposit. Transposing "lines" of codes to "pages" and blocking-out imposes a non-negligible cost on stakeholders—start-ups, NGOs and multinational companies alike—as it consumes time from engineers who might otherwise be developing new content. Stakeholders express a need for the Office to revise deposit requirements to reflect the reality and needs of modern coding.

7. Are independent developers and distributors aware of the value associated with registration for software? How should the Copyright Office publicize the value of software registration for these (and other) groups?

Many developers and engineers do not understand the scope and the benefits of registering their software, and would benefit from more information from the Copyright Office about the value of registration. The lack of understanding about the value of registration is more noticeable among small companies, low-budget organizations, and start-ups than among larger businesses that regularly integrate registration into coordinated work flows between engineers and in-house or outside counsel. Although some developers are aware that the Copyright Office website includes information about the value of registration, most turn to attorneys as the primary source for information about registration. Without attorneys encouraging registration, many developers are less inclined to register.

8. Are current Copyright Office records management policies compatible with the needs of the software industry?

In instances of infringement, some stakeholders are concerned that current Copyright Office records management may hinder their timely access to an executable copy of the registered work.

Dated:
Karyn Temple Claggett
Acting Register of Copyrights, U.S. Copyright Office.