

COPYRIGHT ISSUES WITH THE “BLACK HOLE” IMAGE AND THEIR LEGAL IMPLICATIONS ♦

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ABSTRACT

The release of the world’s first-ever black hole image generated an immediate copyright dispute and revealed multiple copyright issues that remain unsettled. This Article argues that the black hole image should be left in the public domain without copyright protection for the following reasons: First, the image’s copyrightability and copyright ownership are too uncertain to warrant legal protection, making fair use and compulsory licensing largely irrelevant; second, the image is a work of worldwide significance that was created through broad international collaboration with substantial public funding, which strongly implies a public interest in access to the work; and third, a Creative Commons 4.0 Attribution license cannot guarantee public access because it can be changed at any time to a more restrictive license. This Article concludes that only by leaving the black hole image in the public domain can copyright’s objective of increasing public access to creative works and promoting scientific progress be achieved.

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INTRODUCTION

On April 10, 2019, the first-ever black hole image was released, allowing the world to see for the first time a black hole of fifty million light-years. Upon its public dissemination, most media outlets reported on how the historic image was “photographed by a network of eight telescopes across the world.”¹ However, contrary to these initial media reports, it was later revealed that the image was actually the creation of an algorithm written by MIT post-doctoral fellow Katie Bouman.² In the wake of this reveal, swarms of online trolls—who believed that Dr. Bouman’s acceptance of credit was inappropriate because Andre Chael, another scientist, had written more lines of the algorithm and approximately two hundred other scientists had collectively contributed to the final image—engaged in the targeted harassment of Dr. Bouman.³ Amidst this commotion, China’s largest stock image provider, Visual China Group (VCG), claimed copyright ownership in the image by watermarking its logo over it and charging internet users to use it. In response to public outrage, VCG shut down its website and apologized for making a false claim after only three days.⁴

¹ Pallab Ghosh, *First ever black hole image released*, BBC NEWS (Apr. 10, 2019), <https://www.bbc.com/news/science-environment-47873592> [<https://perma.cc/AD2F-7234>].

² Hannah Ellis-Petersen, *Katie Bouman: the 29-year-old whose work led to first black hole photo*, GUARDIAN (Apr. 11, 2019, 4:45 PM), <https://www.theguardian.com/science/2019/apr/11/katie-bouman-black-hole-photo> [perma.cc/P43T-XD7B].

³ Mary Beth Griggs, *Online trolls are harassing a scientist who helped take the first picture of a black hole*, VERGE (Apr. 13, 2019, 8:00 AM), <https://www.theverge.com/2019/4/13/18308652/katie-bouman-black-hole-science-internet> [perma.cc/G3G6-V7AZ].

⁴ Brenda Goh, *Furor over ‘black hole’ photo forces China’s largest image provider to shut*, REUTERS (Apr. 11, 2019, 9:43 PM), <https://www.reuters.com/article/us-china-internet-visualchina/>

The foregoing shows the intense interest in claiming credit for this groundbreaking image and, as a result, reaping the economic benefits of its publication. This Article therefore raises two critically important questions: (1) Who created the black hole image, and (2) who is entitled to ownership in that copyright? In addition, based on the answers offered to those questions, this Article considers whether or not the black hole image—given its unique algorithm-made composition, as opposed to that of a regular photograph—even constitutes a work of authorship capable of receiving copyright protection, as well as whether the largely computer-generated image is original enough to satisfy copyright’s minimum originality requirement, and whether the first-ever image of the universe, as the product of global collaboration sponsored by international public funding, should be placed in the public domain and freely shared. Before contemplating the potential answers to these questions, it is essential to understand the science behind the black hole image’s creation—as the process itself may help unearth the answers this Article seeks to resolve.

First, it is understood from the available reports that the image is not a “photo” captured by a normal camera, but rather an image produced by algorithms based on the data collected by several giant telescopes around the world.⁵ While this image reveals “the shadow of the black hole’s rim—known as the event horizon, or the point of no return—set against the luminous accretion disk,” it is not the black whole itself. Rather, the accretion disk is “made up of hot gases . . . call[ed] plasma, along with the debris of stars torn apart by gravity”; because the accretion disk is “brilliant in contrast,” it can be detected by telescopes.⁶ However, detecting and collecting data from the accretion disk is not an easy task. It requires a planet-sized telescope with unprecedented resolution because, when “viewed from 55 million light-years away on Earth, [a] black hole is only about 42 microarcseconds across on the sky [—i.e., it is] smaller than an orange on the moon would appear to someone on Earth.”⁷ Because building a “planet-sized dish” is obviously an impossible mission, scientists set up eight telescopes at several observatories stationed in North America, Hawaii, Europe, South

furor-over-black-hole-photo-forces-chinas-largest-image-provider-to-shut-idUSKCN1RO06H [https://perma.cc/X9WZ-GLYZ]. The website was later re-opened.

⁵ For this reason, the word “image,” rather than “photo,” is utilized throughout the entirety of this Article.

⁶ AFP, *Revealed: First photograph of black hole and its fiery halo*, GULF NEWS EUR. (Apr. 10, 2019, 9:52 AM), <https://gulfnews.com/world/europe/revealed-first-photograph-of-black-hole-and-its-fiery-halo-1.1554876314083> [https://perma.cc/K6X9-HRSD].

⁷ Maria Temming, *How scientists took the first picture of a black hole*, SCIENCE NEWS (Apr. 10, 2019, 9:57 AM), <https://www.sciencenews.org/article/event-horizon-telescope-black-hole-picture> [https://perma.cc/QGQ6-BCP2].

America, and the South Pole⁸ that are linked together through a process known as interferometry. Together, these eight telescopes formed what is known as the Event Horizon Telescope (EHT).⁹ Using this EHT technology, scientists “froze light at exactly the same times over 9 days in April 2017 by synchronizing to atomic blocks, generating petabytes of data.”¹⁰ The data derived from each of the eight observation stations was then combined using the very long baseline interferometry technique to reveal the appearance of a black hole.¹¹

However, because the data from the EHT was not one hundred percent complete, the black hole image could not be created through the simple combination of that data alone. In fact, there were some missing pieces of data—analogueous to “broken keys” in a piano—that needed to be filled in by imaging software before the image of the black hole could be created.¹² The software required to fill the remaining gaps in the data relied on “mathematical rules about how much randomness any given picture can contain, how bright it should be and how likely it is that neighboring pixels will look similar. Those basic guidelines can inform how software decides which potential images, or data interpretations, make the most sense.”¹³ The algorithms used to fill these gaps were developed by a team of approximately two hundred researchers, including Dr. Bouman and Chael. While Chael, a Harvard Ph.D. candidate, was responsible for developing “new Bayesian imaging methods that push[ed] the EHT’s imaging capabilities to higher fidelity and resolution,”¹⁴ Dr. Bouman and her team wrote CHIRP (Continuous

⁸ Yasemin Saplakoglu, *All Your Questions About the New Black Hole Image Answered*, LIVE SCI. (Apr. 11, 2019), <https://www.livescience.com/65211-questions-answered-first-black-hole-image.html> [<https://perma.cc/LR58-88HD>].

⁹ Korey Haynes, *Event Horizon Telescope releases first ever black hole image*, ASTRONOMY.COM (Apr. 10, 2019), <http://www.astronomy.com/news/2019/04/event-horizon-telescope-releases-first-ever-black-hole-image> [perma.cc/QHG4-WXCX].

¹⁰ Michael Zhang, *How to Take a Picture of a Black Hole*, PETAPIXEL (Apr. 11, 2019), <https://petapixel.com/2019/04/11/how-to-take-a-picture-of-a-black-hole/> [<https://perma.cc/2ERL-55Q2>].

¹¹ For further discussion on how this image was captured, see EHT Collaboration, *First Image of a Black Hole*, EUR. S. OBSERVATORY (Apr. 10, 2019, 3:07 PM), <https://www.eso.org/public/images/eso1907a/> [<https://perma.cc/9F2L-SDT7>].

¹² Temming, *supra* note 7.

¹³ *Id.*

¹⁴ *Imaging Black Holes with the EHT*, ANDREW CHAEL, https://achael.github.io/_pages/imaging/ [<http://perma.cc/TZUA-BFYE>].

High-resolution Image Reconstruction using Patch priors),¹⁵ the clever algebraic formula used to fill in the missing pieces of data.¹⁶

Roughly two years after the initial EHT data was collected, the final image of the supermassive black hole, located inside the huge elliptical galaxy M87, was reconstructed and refined by the algorithms discussed above. The result of this endeavor was subsequently revealed at a joint press conference of the European Southern Observatory (ESO) and the U.S. National Science Foundation (NSF) on April 10, 2019.¹⁷

I. JURISDICTIONAL CONCERNS ABOUT THE COPYRIGHT OF THE BLACK HOLE IMAGE

The copyright in a given work of authorship is territorial; that is, the copyright of a work is protected within a specific set of national borders. It follows, then, that there is no such thing as an international copyright. Although no explicit international copyright exists, the copyright of a work in one country will nevertheless remain protected in a foreign country under the national treatment principle.¹⁸ Accordingly, given the territorial nature of copyright protection, it is necessary to determine for the purposes of this Article (1) the country in which the black hole image, if copyrightable, would be afforded initial protection, and (2) how the image would be protected in other countries if the copyright was in dispute.

According to the Berne Convention, the copyright of a work is protected automatically, without any formality or registration, under the copyright law of the country where the work was first published.¹⁹ In the

¹⁵ Catherine Shu, *The creation of the algorithm that made the first black hole image possible was led by MIT grad student Katie Bouman*, TECHCRUNCH (Apr. 10, 2019, 11:40 PM), <https://techcrunch.com/2019/04/10/the-creation-of-the-algorithm-that-made-the-first-black-hole-image-possible-was-led-by-mit-grad-student-katie-bouman/> [<https://perma.cc/Q8NY-BJC7>].

¹⁶ *See id.* (“If the measurements from three telescopes are multiplied, the extra delays caused by atmospheric noise cancel each other out. This does mean that each new measurement requires data from three telescopes, not just two, but the increase in precision makes up for the loss of information.”)

¹⁷ *Exploring Black Holes*, NAT’L SCI. FOUND., https://www.nsf.gov/news/special_reports/blackholes/ [<https://perma.cc/E8LT-LR2E>].

¹⁸ Berne Convention for the Protection of Literary and Artistic Works art. 5(1), Sept. 9, 1886, *as revised at Paris on July 24, 1971 and amended in 1979*, S. TREATY DOC. No. 99-27 (1986) [hereinafter *Berne Convention*], <https://treaties.un.org/doc/Publication/UNTS/Volume%20828/volume-828-I-11850-English.pdf> [<https://perma.cc/R6U9-AQ8H>] (“Authors shall enjoy, in respect of works for which they are protected under this Convention, in countries of the Union other than the country of origin, the rights which their respective laws do now or may hereafter grant to their nationals, as well as the rights specially granted by this Convention.”).

¹⁹ *Id.* at 233 (“The enjoyment and the exercise of these rights shall not be subject to any formality; such enjoyment and such exercise shall be independent of the existence of protection in the country of origin of the work. Consequently, apart from the provisions of this Convention, the extent of protection, as well as the means of redress afforded to the author to protect his rights, shall be governed exclusively by the laws of the country where protection is claimed.”).

case of the black hole image, because the image was first published in the United States when the ETH and NSF released it at their joint press conference in Washington, D.C.,²⁰ the image, if copyrightable, is entitled to protection in the United States. In the United States, a copyrightable work must be registered with the U.S. Copyright Office and deposited with the Library of Congress in order for its owner to bring a lawsuit for infringement.²¹ At the time of writing, the black hole image had not yet been registered and deposited.²²

The black hole image is also protected in other countries pursuant to the national treatment principle and subject to the copyright requirements of each country. Therefore, if the copyright of the black hole image is allegedly infringed in a given country, the copyright law of that country would be applied to assess the copyrightability and infringement of the image. For example, in the *VCG* case discussed below,²³ if VCG continued to claim copyright over the black hole image, and the copyright holder of the image decided to sue VCG for copyright infringement in China, the Chinese copyright law would be applied to decide whether the image is copyrightable and whether it was infringed.

II. ELIGIBILITY FOR COPYRIGHT PROTECTION OF THE BLACK HOLE IMAGE

The black hole image is different from an ordinary photograph because, unlike a traditional photograph, it was not captured by a conventional camera. Rather, as discussed above, it was processed by supercomputers, then reconstructed and refined by algorithms based on the data collected by eight telescopes. There has never been an image created in such a way before; thus, characterizing the nature of the work poses a novel challenge. Accordingly, based on the way the data was collected and synchronized through telescopes, supercomputers, and algorithms, it must be determined whether the black hole image is a photographic work that is literary or artistic or a work done by a computer, such as a database or computer-generated work.

²⁰ See *Exploring Black Holes*, *supra* note 17.

²¹ 17 U.S.C. § 407 (2012), <https://www.govinfo.gov/content/pkg/USCODE-2010-title17/pdf/USCODE-2010-title17-chap4-sec407.pdf> [<https://perma.cc/V43Y-EKA2>].

²² When this Article was written, a search request for “Black hole image” on the U.S. Copyright Office’s electronic Registration Portal compiled a list of only two potentially relevant copyright registrations: “Anthony Ventarola Black Hole Image 1” and “Anthony Ventarola Black Hole Image 1 and 2” (VAu001217478 and VAu001198459, respectively). See *Public Catalog*, U.S. COPYRIGHT OFF., https://cocatalog.loc.gov/cgi-bin/Pwebrecon.cgi?Search_Arg=Black+hole+image&Search_Code=FT*&PID=oYDboYxsfqucixvpWFI53Kcus&SEQ=20190514211556&CNT=25&HIST=1 [<https://perma.cc/24W5-RV3G>].

²³ See discussion *infra* Section IV.A.

A. *Is the Black Hole Image an Expression or an Idea?*

It is a universal rule that copyright protection only extends to expression, not to ideas.²⁴ Ideas refer not only to stories, plots, rules, methods, and procedures, but also to data, facts, and information.²⁵ Therefore, if the black hole image is just an idea that has not been reduced to a literary or artistic expression, it cannot be protected by copyright. The given facts show that the theory of black hole has been transformed into an image, or an expression that matches the EHT’s observations.²⁶ Therefore, it may be concluded that the image is an expression, not an idea, and is thus entitled to copyright protection.

Nevertheless, this argument may be challenged on at least two fronts. First, one may contend that the black hole image is not a literary or artistic expression because it is not literary or artistic in nature. However, the Berne Convention specifically included “scientific domain” within the scope of “literary and artistic works.”²⁷ Therefore, an image depicting a scientific discovery such as the black hole should be within that scope.

Second, one may argue that the black hole image, as a literary or artistic expression, is merged with an idea because that image might be the only way to depict what the black hole looks like—any other way of reproducing it might not accurately portray it. Therefore, under the merger doctrine, it could possibly be determined that the black hole image is not copyrightable. The court in *Herbert Rosenthal Jewelry Corp. v.*

²⁴ See Zhonghua Renmin Gongheguo Zhuzuoquan Fa (中华人民共和国著作权法) [Copyright Law of the People’s Republic of China] (promulgated by the Standing Comm. Nat’l Cong., Feb. 26, 2010, effective Apr. 1, 2010) 2010 STANDING COMM. NAT’L PEOPLE’S CONG. GAZ. 158, art. 3 [hereinafter PRC Copyright Law]; see also Directive 2009/24/EC, of the European Parliament and of the Council of 23 April 2009 on the Legal Protection of Computer Programs, art. 1.2, 2009 O.J. (L 111) 16, 18; see also 17 U.S.C. § 102(b), <https://www.govinfo.gov/content/pkg/USCODE-2011-title17/pdf/USCODE-2011-title17-chap1-sec102.pdf> [<https://perma.cc/MX87-UBDU>]; see also WIPO Copyright Treaty art. 2, Dec. 20, 1996, 2186 U.N.T.S. 121; see also Trade-Related Aspects of Intellectual Property Rights art. 9.2, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 1869 U.N.T.S. 299 [hereinafter TRIPS].

²⁵ See *Baigent v. Random House Grp., Ltd.*, [2007] EWCA (Civ) 247 (“[An original expression] does not, however, extend to clothing information, facts, ideas, theories and themes with exclusive property rights, so as to enable the Claimants to monopolize historical research or knowledge and prevent the legitimate use of historical and biographical material, theories propounded, general arguments deployed, or general hypotheses suggested (whether they are sound or not) or general themes written about.”).

²⁶ Heino Falcke et al., *Astronomers Capture First Image of a Black Hole*, EUR. S. OBSERVATORY (Apr. 10, 2019), <https://www.eso.org/public/news/eso1907/> [<https://perma.cc/GXD3-MAKG>] (“Once we were sure we had imaged the shadow, we could compare our observations to extensive computer models that include the physics of warped space, superheated matter and strong magnetic fields. Many of the features of the observed image match our theoretical understanding surprisingly well.”).

²⁷ Berne Convention, *supra* note 18, art. 2 (stating that literary and artistic works “shall include every production in the literary, scientific and artistic domain whatever may be in the mode or form of its expression” (emphasis added)).

Kalpakistan explained the merger doctrine as follows: “When the ‘idea’ and its ‘expression’ are . . . inseparable, copying the ‘expression’ will not be barred, since protecting the ‘expression’ in such circumstances would confer a monopoly of the ‘idea’ upon the copyright owner free of the conditions and limitations imposed by the patent law.”²⁸ However, one could easily counter this argument by contending that the black hole image is simply an ordinary photograph, copyrightable like any other photograph depicting reality, e.g., a photo of the Lincoln Memorial.

B. *Is the Black Hole Image a Photographic Work?*

It is perhaps natural for people to think that the black hole image is a photographic work when they first see it because it looks like a “photo.” In fact, many journalists have even used the term “photo” to describe the image of the black hole in their reports.²⁹ However, given the nature of the black hole image, this characterization may be misleading—namely because the black hole image is neither a normal photograph taken through conventional means, nor a precise and complete reflection of the black hole itself. Instead, it is an image created and refined through the use of computer algorithms based on the data collected by the EHT. This distinction should not be overlooked, as it could potentially make a significant difference in determining the copyrightability of the black hole image.

It has long been debated whether a photograph is a “mechanical representation of some set of real-world facts” or a “compilation of facts”³⁰—in other words, whether a photographic device can do anything more than merely record the physical world. A photograph, some have said, “copies everything and explains nothing.”³¹ However, in *Burrow-Giles Lithographic Co. v. Sarony*, the United States Supreme Court held that “[u]nless . . . photographs can be distinguished in the classification of this point from the maps, charts, designs, engravings, etchings, cuts, and other prints, it is difficult to see why [C]ongress cannot make them the subject of copyright as well as the others.”³² Photographs were added to the copyright statutes in both the United Kingdom and the United States in 1862 and 1865, respectively.³³ In France, the Cour de Cassation has held that photographs can be protected under France’s 1793 *droit*

²⁸ *Herbert Rosenthal Jewelry Corp. v. Kalpakian*, 446 F.2d 738, 742 (9th Cir. 1971).

²⁹ See, e.g., Meghan Bartels, *The Scientists Behind the First Black Hole Photo Get Nod from Congress*, SPACE.COM (May 17, 2019), <https://www.space.com/first-black-hole-photo-science-team-meets-congress.html> [<https://perma.cc/YJF6-UDZT>].

³⁰ Justin Hughes, *The Photographer’s Copyright – Photograph as Art, Photograph as Database*, 25 HARV. J.L. & TECH. 327, 328, 349 (2012).

³¹ *SHL Imaging, Inc. v. Artisan House, Inc.*, 117 F. Supp. 2d 301, 307 (S.D.N.Y. 2000).

³² *Burrow-Giles Lithographic Co. v. Sarony*, 111 U.S. 53, 57 (1884).

³³ Hughes, *supra* note 30, at 340.

d’auteur law.³⁴ Therefore, photographs have been considered copyrightable subject matter in some jurisdictions, subject to the originality test discussed later in this Article. For now, the primary question to be considered is whether the black hole image is a photograph.

The United Kingdom’s Copyright, Designs and Patents Act (CDPA) defines a photograph as “a recording of light or other radiation on any medium on which an image is produced or from which an image may by any means be produced, and which is not part of a film.”³⁵ Similarly, the Copyright Law of the People’s Republic of China (PRC) defines a photographic work as an “artistic work created with the aid of devices by recording images on light-sensitive materials or other media.”³⁶ Under these definitions, the black hole image can be characterized as a photograph. It was produced on a medium based on the synchronization or synthesize of data that were captured from “the luminous accretion disk” that was “brilliant in contrast.”³⁷ The process of recoding light or radiation on a medium to make the black hole image was more complicated and lengthier than a camera’s process because it required the use of eight telescopes over the course of two years.³⁸ However, the mechanisms used to make the photos were the same: recording the light or radiation on a medium. Therefore, because the black hole image can be characterized as a photograph, and because photographs are eligible for copyright protection, the black hole image should be entitled to copyright protection.

C. *Is the Black Hole Image a Database or a Computer-Generated Work?*

Assuming the black hole image is not a photograph, it must be determined whether it is a database or a computer-generated work. While the former is eligible for copyright protection,³⁹ the latter’s copyright eligibility remains unclear. According to the United Kingdom’s CDPA, a “database” is “a collection of independent works, data or other materials, which (a) are arranged in a systematic or methodical way, and

³⁴ *Id.* at 364 n.142.

³⁵ Copyright, Designs and Patents Act 1988, c.48, § 4(2)(b) (U.K.).

³⁶ PRC Copyright Law, *supra* note 24, art. 21.

³⁷ AFP, *supra* note 6.

³⁸ See discussion *supra* INTRODUCTION.

³⁹ TRIPS, *supra* note 24, at 6 (“Compilations of data or other material, whether in machine readable or other form, which by reason of the selection or arrangement of their contents constitute intellectual creations shall be protected as such. Such protection, which shall not extend to the data or material itself, shall be without prejudice to any copyright subsisting in the data or material itself.”).

(b) are individually accessible by electronic or other means.”⁴⁰ Professor Justin Hughes opined that photographic records of independent reality are similar to the selection and arrangement of a database.⁴¹ This Article, however, does not agree with that observation. In this case, it is evident that the black hole image is not a database. Although its creation included the collection of data that was ultimately synchronized and transformed into an image, the data itself was not arranged in a systematic or methodical way, such as in a telephone book or a catalogue. Thus, because there was no technical arrangement of data, the image of the black hole does not constitute a database.

The black hole image can also be distinguished from a “computer-generated work.” The United Kingdom’s CDPA provides, in relevant part, that “‘computer-generated,’ in relation to a work, means that the work is generated by computer in circumstances such that there is no human author of the work.”⁴² This definition is arguably directed at works created by artificial intelligence (AI), which are automated by AI and therefore maintain no human intervention throughout the creation process. Importantly, here it is clear that scientists intervened in the creation process of the black hole image from the beginning to the end. Not only did these human scientists control the data collection and synchronization process, but they also wrote the algorithms to reconstruct and refine the data in order to obtain the final image. Because this process was not automated, the image should not be treated as a “computer-generated work.”

Although the black hole image is not a conventional “photo,” it can nevertheless be characterized as a photographic work eligible for copyright protection. Moreover, it is neither a database nor a computer-generated work, even though its creation involved the collection and synchronization of data through a computer.

III. COPYRIGHTABILITY OF THE BLACK HOLE IMAGE

In order for a literary and/or artistic work to be eligible for copyright protection, it must satisfy both the originality requirement and the fixation requirement of the statute. Because the black hole image has been expressed as an image in a fixed medium of expression and was subsequently published, it unquestionably satisfies the fixation requirement for those countries that require fixation, such as the United States.⁴³

⁴⁰ Copyright, Designs and Patents Act 1988, c.48, § 3A(1) (U.K.).

⁴¹ Hughes, *supra* note 30, at 336, 349, 355.

⁴² Copyright, Designs and Patents Act 1988, c.48, § 178 (U.K.).

⁴³ 17 U.S.C. § 102 (2012); *see also id.* § 101, <https://www.govinfo.gov/content/pkg/USCODE-2011-title17/pdf/USCODE-2011-title17-chap1-sec101.pdf> [<https://perma.cc/D93N-FAEA>]

The U.S. Copyright Act confers copyright protection only on “original work[s] of authorship.”⁴⁴ The United States Supreme Court has held that to give an author an exclusive right over a work, that work must contain “a degree of originality.”⁴⁵ To be “original,” the work must be “independently created by the author (as opposed to copied from other works).”⁴⁶ In addition, the work must “possess[] at least some minimal degree of creativity.”⁴⁷ Alternatively, in the United Kingdom a work can be designated original under the doctrine of “sweat of the brow,” meaning that it can be treated as original when the author has exercised the requisite labor, skill, and judgment to produce it.⁴⁸

A. *Originality of Photographic Works Under the U.S. Copyright Law*

In the United States, the “ordinary production of a photograph” may have no copyright protection.⁴⁹ Therefore, United States copyright law protects photographs “only such as are *original*, and are founded in the creative powers of the mind.”⁵⁰ The originality or creative power is generally reflected in the photographers’ arrangement of “lighting, angle, perspective, and the other ingredients that traditionally apply to that art-form.”⁵¹ Judge Learned Hand stated, “[N]o photograph, however simple, can be unaffected by the personal influence of the author.”⁵² As a result, “courts have recognized repeatedly that the creative decisions involved

(explaining that a work, to be protectable, must be fixed in a tangible medium of expression”). Pursuant to section 101, “[a] work is fixed in a tangible medium of expression when its embodiment in a copy or phonorecord . . . is sufficiently permanent or stable to permit it to be perceived, reproduced, or otherwise communicated for a period of more than transitory duration. A work consisting of sounds, images, or both, that are being transmitted, is ‘fixed’ for purposes of this title if a fixation of the work is being made simultaneously with its transmission.” *Id.* § 101.

⁴⁴ *Id.* § 102(a) (“Copyright protection subsists, in accordance with this title, in original works of authorship fixed in any tangible medium of expression, now known or later developed, from which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device.”).

⁴⁵ *Feist Publ’ns, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 346 (1991).

⁴⁶ *Id.* at 345; *see Burrow-Giles Lithographic Co. v. Sarony*, 111 U.S. 53, 58 (1884).

⁴⁷ *Feist Publ’ns, Inc.*, 499 U.S. at 345.

⁴⁸ *Ladbroke v. William Hill* [1964] 1 All ER 465 (HL) (Eng.).

⁴⁹ *Burrow-Giles Lithographic Co.*, 111 U.S. at 59.

⁵⁰ Trade-Mark Cases, 100 U.S. 82, 94 (1879).

⁵¹ MELVILLE B. NIMMER & DAVID NIMMER, NIMMER ON COPYRIGHT § 3.03[C][3] (Matthew Bender, rev. ed. 2019); *see Latimer v. Roaring Toyz, Inc.*, 601 F.3d 1224, 1230 (11th Cir. 2010) (holding that “decisions regarding lighting, appropriate camera equipment and lens, camera settings and use of the white background” are factored in to the originality test); *see also Roger v. Koons*, 960 F.2d 301, 307 (2d Cir. 1992) (“Elements of originality in a photograph may include posing the subjects, lighting, angle, selection of film and camera, evoking the desired expression, and almost any other variant involved”); *see also Leigh v. Warner Bros.*, 10 F. Supp. 2d 1371, 1376 (S.D. Ga. 1998) (holding that the originality of the photograph was in “the photographer’s selection of background, lights, shading, positioning of subject, and timing”).

⁵² *Jewelers’ Circular Pub. Co. v. Keystone Pub. Co.*, 274 F. 932, 934 (S.D.N.Y. 1921).

in producing a photograph may render it sufficiently original to be copyrightable”⁵³ and “have carefully delineated selection of subject, posture, background, lighting, and perhaps even perspective alone as protectible elements of a photographer’s work.”⁵⁴ For example, a portrait photograph of Oscar Wilde was held to be an original work of art,⁵⁵ as was a product shot of a vodka bottle.⁵⁶ In addition, there is a “tradition of near-presumptive copyright protection” for photographs in the United States.⁵⁷

As a photographic work, the black hole image is likely to be protected as an original work of art given the low threshold of the originality requirement. However, the problem here is that, unlike a portrait photograph or product shot taken by a traditional camera, the black hole image, which utilized telescopes and computer algorithms, does not invoke a photographer’s independent exercise of judgement or arrangement in terms of lighting, setting, etc. Unlike a traditional photograph, no effort in the creation of the black hole image was devoted to background setting or lighting. In fact, the purpose of producing the image was to make it resemble, as closely as possible, the image of a real black hole. This raises the issue of whether a photo or an image is original if it accurately reflects reality, without the photographer’s selection of background, lighting, shading, positioning of the subject, timing, or decisionmaking about the appropriate camera equipment and lens to use. It also raises the related issue of how originality is to be assessed “in an age of virtual worlds and digital media that seek to mimic the ‘real’ world.”⁵⁸ The image of the black hole falls within the category of “reality photographs” because it truthfully represents, or attempts to truthfully represent, reality.

Hughes pointed out that reality photographs have a greater chance of being deemed ineligible for copyright protection.⁵⁹ Professor Daniel Gervais opined that “a photographer trying to take a technically perfect picture is not making *creative* choices”⁶⁰ Thus, the photographic transparencies of paintings in the public domain have been held to be

⁵³ *L.A. News Serv. v. Tullo*, 973 F.2d 791, 794 (9th Cir. 1992) (quoting *United States v. Hamilton*, 583 F.2d 448, 452 (9th Cir. 1978)).

⁵⁴ *Id.*

⁵⁵ *Burrow-Giles Lithographic Co. v. Sarony*, 111 U.S. 53, 60 (1884).

⁵⁶ See generally *Ets-Hokin v. Sky Spirits Inc.*, 225 F.3d 1068 (9th Cir. 2000).

⁵⁷ Eva E. Subotnick, *Originality Proxies: Toward a Theory of Copyright and Creativity*, 76 BROOK. L. REV. 1487, 1493 (2011), <https://brooklynworks.brooklaw.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1181&context=blr> [https://perma.cc/3HNW-8NMK].

⁵⁸ *Meshwerks, Inc. v. Toyota Motor Sales U.S.A., Inc.*, 528 F.3d 1258, 1263 (10th Cir. 2008).

⁵⁹ Hughes, *supra* note 30, at 362.

⁶⁰ Daniel J. Gervais, *Feist Goes Global: A Comparative Analysis of the Notion of Originality in Copyright Law*, 49 J. COPYRIGHT SOC’Y U.S.A. 949, 956 (2002).

“slavish copies” unprotected by copyright.⁶¹ Other similar situations have involved photographs produced by surveillance cameras, satellite systems, and Google Maps Street View, which, according to Hughes, “are not intended as creative expression at all; they are intended as plain historical records.”⁶² Hughes used Justice Miller’s words to describe “twenty-first century satellite photos [as] the product of automated operations ‘by use of . . . instruments’ to create ‘the visible representation of some existing object[s].’”⁶³ Despite this, Google has claimed copyright for all images on Google Maps and Google Earth.⁶⁴ Hughes argued that these satellite images, whether selected or arranged, “represent an effort at a comprehensive database of images — exactly the sort of database selection the *Feist* decision tells us is not protected by copyright.”⁶⁵

In following the above-stated line of reasoning—against the copyrightability of reality photographs—the black hole image could potentially be considered unoriginal because, similar to satellite photographs, it was intended to be and indeed is a depiction of an independent reality: a black hole. However, the difference between the black hole image at issue here and satellite photos is that the black hole image was not taken directly by a camera, but rather was created by the digital synchronization of data collected by eight telescopes. Does that make it more original than satellite photographs or other depictions of independent reality?

*Meshwerks v. Toyota*⁶⁶ may shed some light on this issue because it involved the digital modeling of a car, which is similar to the digital synchronization of data for the black hole image. In that case, Meshwerks produced digital models of Toyota cars that involved “collecting physical data points from the object to be portrayed.”⁶⁷ Following a very complicated and time-consuming modeling process,⁶⁸ the Meshwerks staff “fine-tuned” or “sculpted” the lines on the screen “to resemble each vehicle as closely as possible.”⁶⁹ Writing on behalf of the court, former

⁶¹ *Bridgeman Art Library, Ltd. v. Corel Corp.*, 36 F. Supp. 2d 191, 197 (S.D.N.Y. 1999).

⁶² Hughes, *supra* note 30, at 380.

⁶³ *Id.* at 381 (citing *Burrow-Giles Lithographic Co. v. Sarony*, 111 U.S. 53, 57 (1884)).

⁶⁴ *Google Maps/Google Earth Additional Terms of Service*, GOOGLE, https://www.google.com/help/terms_maps/ [perma.cc/CX3A-K3Z8] (last modified Jan. 21, 2019).

⁶⁵ Hughes, *supra* note 30, at 372.

⁶⁶ *Meshwerks, Inc. v. Toyota Motor Sales U.S.A., Inc.*, 528 F.3d 1258, 1260 (10th Cir. 2008).

⁶⁷ *Id.* at 1260.

⁶⁸ *Id.* (“Meshwerks took copious measurements of Toyota’s vehicles by covering each car, truck, and van with a grid of tape and running an articulated arm tethered to a computer over the vehicle to measure all points of intersection in the grid. Based on these measurements, modeling software then generated a digital image resembling a wire-frame model. In other words, the vehicles’ data points (measurements) were mapped onto a computerized grid and the modeling software connected the dots to create a “wire frame” of each vehicle.”).

⁶⁹ *Id.*

Circuit Court Judge Gorsuch (now a Supreme Court justice) concluded that “Meshwerks’ models are not so much independent creations as (very good) copies of Toyota’s vehicles.”⁷⁰ Referring to the Supreme Court’s ruling in *Feist*,⁷¹ he added that the “Meshwerks’ models depict nothing more than unadorned Toyota vehicles—the car *as car* [T]he unequivocal lesson from *Feist* is that works are not copyrightable to the extent they do not involve any expression apart from the raw facts in the world.”⁷² As a result, the court held that “[t]o the extent that Meshwerks’ digital wire-frame models depict only those unadorned vehicles, having stripped away all lighting, angle, perspective, and ‘other ingredients’ associated with an original expression, we conclude that they have left no copyrightable matter.”⁷³

The United States courts have also denied copyright protection to works that are copies of facts or copies of prior works of art, such as an architectural drawing “set[ting] forth the existing physical characteristics of the site, including its shape and dimensions, the grade contours, and the location of existing elements, [because] it sets forth facts”⁷⁴ Professor Mary Campbell Wojcik opined that “the law is becoming increasingly clear: one possesses no copyright interest in reproductions . . . when these reproductions do nothing more than accurately convey the underlying image.”⁷⁵ In other words, “[t]he fact that a work in one medium has been copied from a work in another medium does not render it any the less a ‘copy.’”⁷⁶ Therefore, even though the digital models in *Meshwerks* were two-dimensional depictions of Toyota’s three-dimensional physical objects, it did not help Meshwerks’ case. The court held that the intent of Meshwerks’ graphic sculptors was to “create realistic-looking depictions of complicated real-world objects on a two dimensional screen . . . a digital representation of the real object.” In the court’s view, this intent was further evidence that the digital models lacked originality.⁷⁷

⁷⁰ *Id.* at 1264.

⁷¹ *Feist Publ’ns, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 346 (1991).

⁷² *Meshwerks*, 528 F.3d at 1265; *see also Feist Publ’ns, Inc.*, 499 U.S. at 346.

⁷³ *Meshwerks, Inc.*, 528 F.3d at 1266-67.

⁷⁴ *Sparaco v. Lawler, Matusky & Skelly Eng’rs LLP*, 303 F.3d 460, 467 (2d Cir. 2002).

⁷⁵ Mary Campbell Wojcik, *The Antithesis of Originality: Bridgeman, Image Licensors, and the Public Domain*, 30 HASTINGS COMM. & ENT. L.J. 257, 267 (2008), https://repository.uchastings.edu/cgi/viewcontent.cgi?article=1646&context=hastings_comm_ent_law_journal [https://perma.cc/R7QZ-2CNP].

⁷⁶ *NIMMER & NIMMER*, *supra* note 51, § 8.01[B]; *see also Entm’t Research Grp., Inc. v. Genesis Creative Grp., Inc.*, 122 F.3d 1211, 1221-24 (9th Cir. 1997) (denying copyright protection to 3D costumes based on 2D cartoon characters); *see also Durham Indus., Inc. v. Tomy Corp.*, 630 F.2d 905, 910 (2d Cir. 1980) (holding that “the mere reproduction of the Disney characters in plastic . . . does not constitute originality as this Court has defined the term”).

⁷⁷ *Meshwerks, Inc.*, 528 F.3d at 1268.

Applying the foregoing rulings and arguments to the black hole image, it is possible, if not probable, that the black hole image does not meet the requisite threshold for originality needed to qualify for copyright protection. There are three reasons for this. First, similar to Meshwerks’ digital models, the black hole image was created and refined by algorithms based on the data collected by the telescopes. It depicts nothing more than the unadorned black hole, without adding any light, color, background setting, etc. It is both an accurate reflection of the underlying reality and a copy of the facts in the world; therefore, it adds no originality that would qualify it for copyright protection. Second, although the black hole image is a two-dimensional digital image of a three-dimensional black hole in the universe, the change of the form does not make it less of a “copy.” Third, the intention of the scientists involved in the creation of the black hole image was to create an image as realistic as and identical to the real black hole as possible, which serves as evidence that the black hole image lacks the requisite originality.

Notwithstanding the foregoing, originality may be found in another way: by comparing the black hole image to the satellite image with “multiple layers of data.”⁷⁸ This type of satellite image, according to NASA, has two different dates: a data collection date and a “visualization date” (when the raw data is converted into the final image displayed).⁷⁹ “With more complex images, data may come from a series of inputs gathered over a long period of time.”⁸⁰ For example, NASA’s 2000 “Blue Marble” Earth image was created through a lengthy and complicated digital compilation and elevation adding multiple layers of data to represent, among other variables, the Earth, clouds, and the ocean; “[t]he researchers chose to translate the digital data over land into a color scheme where heavy vegetation is green and sparse vegetation is yellow.”⁸¹ Hughes argued that if the data were compiled to make a factually accurate image with absolute fidelity, then the extra effort to choose the vegetation color “might very well be what Justice O’Connor

⁷⁸ Hughes, *supra*, note 30, at 372-75.

⁷⁹ See, e.g., *Guam*, NASA, <http://visibleearth.nasa.gov/view.php?id=77189> [<https://perma.cc/GWQ3-HKXR>]; see also Hughes, *supra* note 30, at 372.

⁸⁰ Hughes, *supra* note 30, at 373.

⁸¹ “The underlying image of the full disk of Earth and its clouds was taken on September 9, 1997, by a Geostationary Operational Environmental Satellite (GOES) operated by the U.S. National Oceanic and Atmospheric Administration (NOAA), and built by NASA. The ocean data was collected in late September and early October 1997 by NASA’s Sea-viewing Wide Field-of-view Sensor (SeaWiFS) satellite. The land color is portrayed by a vegetation index calculated using data collected from September 9-19, 1997, by Advanced Very High Resolution Radiometer (AVHRR) instruments carried aboard NOAA’s Polar Orbiting Environmental Satellites (POES). These data are draped across a digital elevation model of Earth’s topography from the U.S. Geological Survey.” *Id.* at 373-74 (quoting *Earth – The Blue Marble*, NASA, <http://visibleearth.nasa.gov/view.php?id=54388> [<https://perma.cc/YM76-QBKW>]).

would have called ‘garden-variety’ choices.” These render no originality to the image.⁸² However, “the addition of ‘synthetic ocean imagery’ by Google and the quirky portrayal of elevations at NASA are not as easy to dismiss, particularly because they suggest representations beyond the perfect satellite image.”⁸³ Therefore, Hughes concluded, “[t]o the degree that the layering of data from different sources including some synthetic imagery produces an enhanced satellite image different from what our best direct observational equipment could produce, copyrightability of that image will probably turn on subtle nuances in our originality standard.”⁸⁴

Hughes further explored whether these enhancements had been added manually or by algorithms, but stopped short of differentiating how these two situations might affect the copyrightability of the satellite photographs. Rather, he indicated that the combinational efforts both manually and by computers would lead to two possible results: Either (1) no human originality under American copyright law, or (2) a copyright under the standard of “a very modest grade of art”⁸⁵ or a “modicum of creativity”⁸⁶ “without any imputation of personal expression.”⁸⁷ This points to the different stages and involvement of computer algorithms in creating satellite photographs and is helpful to understand and analyze the originality or copyrightability of the black hole image.

Technically, the black hole image is different from satellite photographs in that the direction of creating the images is reversed. The former is an image of the universe created by telescopes and computers on the ground. The latter are photos of the Earth taken by satellites from the universe above it. In the former case, eight virtually connected telescopes collected the data, and computer algorithms were used to convert and refine the data into an image.⁸⁸ In the latter case, computers, as well as technical specialists, interpreted the data using knowledge of both “remote sensing and the sensed material’s characteristics,” which involves “extensive human labor and application of computer systems.”⁸⁹ Even with these differences, some commonalities between the two types

⁸² *Id.* at 374; *see also* *Feist Publ’ns, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 362 (1991).

⁸³ Hughes, *supra* note 30, at 374.

⁸⁴ *Id.*

⁸⁵ *Bleistein v. Donaldson Lithographing Co.*, 188 U.S. 239, 250 (1903).

⁸⁶ *Feist Publ’ns, Inc.*, 499 U.S. at 346.

⁸⁷ Hughes, *supra* note 30, at 375.

⁸⁸ *See* EHT Collaboration, *supra* note 11 (describing the process of making the image of the black hole).

⁸⁹ Charles Davies et al., *Moving Pictures: How Satellites, the Internet, and International Environmental Law Can Help Promote Sustainable Development*, 28 STETSON L. REV. 1091, 1117 (1999), <https://www.stetson.edu/law/lawreview/media/document/moving-pictures-how-satellites-the-internet-and-international-environmental-law-can-help-promote-sustainable-development.pdf> [<https://perma.cc/57VW-2GQP>].

of images can still be drawn. First, neither are one-time shots as would be found in a standard photo-taking setting. They have two different stages of data collection and data conversion over a long period of time. Second, both rely on the assistance of computer systems to synthesize, synchronize, enhance, and refine the image based on the collected data. Based on these commonalities, the issue becomes whether “extensive human labor,” the “application of computer systems,” and “interpret[ation] by computers”⁹⁰ can qualify the black hole image as an original work that is copyrightable. The copyright laws of different jurisdictions vary substantially regarding this issue and can reach very different conclusions.

In the case of the black hole image, the investment of time, effort, labor, and skill is immeasurable. Its creation involved the best telescopes and computers, over two hundred people, more than ten years of effort, and considerable funding from all over the world.⁹¹ However, even this may be insufficient for the black hole image to qualify as original under the U.S. copyright law. As the court said in *Meshwerks*, “[I]n assessing the originality of a work for which copyright protection is sought, we look only at the final *product*, not the process, and the fact that intensive, skillful, and even creative labor is invested in the process of creating a product does not guarantee its copyrightability.”⁹² Pursuant to this view, the black hole image may be uncopyrightable in the United States. However, other countries, such as the U.K., Canada, France, and China, have adopted looser standards under which the black hole image may be copyrightable, as discussed below.

B. *Alternative Views on Originality*

Unlike the U.S. copyright law that requires “minimum creativity,”⁹³ the U.K. copyright law follows the “sweat of the brow” doctrine to

⁹⁰ Hughes, *supra* note 30, at 374; see *Feist Publ'ns, Inc.*, 499 U.S. at 346.

⁹¹ See discussion *supra* INTRODUCTION.

⁹² *Meshwerks, Inc. v. Toyota Motor Sales U.S.A., Inc.*, 528 F.3d 1258, 1268 (10th Cir. 2008); see HOWARD B. ABRAMS, *THE LAW OF COPYRIGHT* § 2:8 (2018) (“Even if the *process* is both expensive and intricate, an exact or near-exact duplicate of an original should not qualify for copyright.” (emphasis added)); see also Wojcik, *supra* note 75, at 267 (“This is not to say that [accurately reproducing an underlying image] requires no skill or effort; it simply means that such skill and effort does not suffice to invoke the highly advantageous legal monopoly granted under the Copyright Act.”).

⁹³ “The most important consequence of Feist is that it has interjected a distinct inquiry concerning creativity into the originality equation. In addition to the traditional originality inquiry into whether a work was independently originated, there must also be a determination that whatever was independently originated was sufficient creative to satisfy Feist. Equally as important, Feist holds this two-step analysis for issues of originality constitutionally mandated.” See Howard B. Abrams, *Originality and Creativity in Copyright Law*, 55 L. & CONTEMP. PROBS. 3, 14 (1992), <https://scholarship.law.duke.edu/cgi/viewcontent.cgi?article=4136&context=lcp> [<https://perma.cc/7H2R-7HJL>].

determine a work's originality. Under this doctrine, a work is deemed original when its author exercises the requisite labor, skill, and judgment to produce it.⁹⁴ Thus, a shorthand note of a public speech,⁹⁵ the design of a football betting coupon,⁹⁶ and university examination papers⁹⁷ have all been decided by U.K. courts to be original and copyrightable. The U.K. CDPA has also provided that "a literary work consisting of a database is original if, and only if, by reason of the selection or arrangement of the contents of the database the database constitutes the author's own intellectual creation."⁹⁸ Therefore, due to the tremendous investment of labor, time, capital, judgment, and skills, the black hole image could be protected as a database in the U.K, even if it is unprotectable as a photographic work. However, the black hole image is unlikely to be protected as a "computer-generated work" in the U.K. because the image was not automatically created by a computer, and the U.K. CDPA defines a "computer-generated" work as one with "no human author."⁹⁹

The image is also likely to be treated as original under the Canadian copyright law, which takes a middle ground between the U.S. and the U.K. positions. In *CCH Canadian Ltd v. Law Society of Upper Canada*, Chief Justice McLachlin ruled, on behalf of the court, that "[t]he exercise of skill and judgment required to produce the work must not be so trivial that it could be characterized as a purely mechanical exercise," but that "creativity is not required to make a work 'original.'"¹⁰⁰ She also defined "skill" as "the use of one's knowledge, developed aptitude or practised ability in producing the work" and "judgment" as "the use of one's capacity for discernment or ability to form an opinion or evaluation by comparing different possible options in producing the work."¹⁰¹ The process of creating the black hole image clearly demonstrated such "skill" and "judgment," and it was neither trivial nor "a pure mechanical exercise." Hence, it would likely be treated as original and copyrightable in Canada.

In France, some commentators have argued that satellite photographs may be deemed original and copyrightable under the French

⁹⁴ Sometimes the words "labor, skill and judgment" are replaced with the words "work, capital, effort, industry, time, experiences or investment." See *Ladbroke v. William Hill* [1964] 1 All ER 465 (HL) (Eng.).

⁹⁵ *Walter v. Lane* [1900] AC 539 (HL) (Eng.).

⁹⁶ *Ladbroke v. William Hill* [1964] 1 All E.R. 465 (HL) (Eng.).

⁹⁷ *Univ. of London Press Ltd. v. Univ. Tutorial Press Ltd.* [1916] 2 Ch 601 (Eng.).

⁹⁸ Copyright, Designs and Patents Act 1988, c. 1, § 3A(2) (Eng.) ("[A] literary work consisting of a database is original if, and only if, by reason of the selection or arrangement of the contents of the database the database constitutes the author's own intellectual creation.").

⁹⁹ See discussion, *supra* Section II.B.

¹⁰⁰ *CCH Canadian, Ltd. v. Law Soc'y of Upper Canada*, [2004] S.C.R. 339 (Can.).

¹⁰¹ *Id.*

copyright law.¹⁰² For example, Pierre-Yves Gautier suggested that a satellite photograph can be protected under French law at least where there are “adjustments done on the ground and especially subsequent treatment” of the image.¹⁰³ In 2003, the French court ruled that satellite images were protected under copyright where the processing of the raw data involved “human creations and initiatives” in generating the satellite images.¹⁰⁴ Due to their similarities with satellite photographs, as discussed earlier, the black hole images may be considered original and copyrightable under the French law.

Finally, the black hole image may be protected by the Chinese copyright law under which a copyrighted work is an “intellectual creation in the literary, artistic, and scientific domains that possesses ‘originality.’”¹⁰⁵ Originality means that the work is independently created from the author’s own intellectual activities and has not been copied from others.¹⁰⁶ In practice, originality requires a minimum degree of creativity—the mere investment of skill and labor is insufficient for copyright protection, similar to the U.S. standard. However, when the creation of the work requires professional judgment and expertise, it may be protected. For example, the skill and labor involved in the selection and arrangement of medicinal contents in a spreadsheet were treated as evidence of the work’s originality.¹⁰⁷ Therefore, it could be argued that the professional judgment and expertise demonstrated in the creation of the black hole image would render the image sufficiently original under the PRC copyright law.

¹⁰² Hughes, *supra* note 30, at 375.

¹⁰³ PIERRE-YVES GAUTIER, PROPRIÉTÉ LITTÉRAIRE ET ARTISTIQUE § 118, at 151 (6th ed. 2007) (citing Hughes, *supra* note 30, at 375).

¹⁰⁴ Cour d’appel [CA] [regional court of appeal] Riom, ch. com, May 14, 2003, 11/02993 (citing Hughes, *supra* note 30, at 375).

¹⁰⁵ Regulation for the Implementation of the Copyright Law of the People’s Republic of China (promulgated by the Standing Comm. Nat’l Cong., Feb. 26, 2010, effective Apr. 1, 2010), art. 2 [hereinafter Regulations for the Implementation] (“The term ‘works’ as referred to in the Copyright Law means intellectual creations with originality in the literary, artistic or scientific domain, insofar as they can be reproduced in a tangible form.”). For further discussion on copyrightability under PRC copyright law, see Yahong Li, *China*, in INTERNATIONAL COPYRIGHT LAW AND PRACTICE CHI § 1, § 2[1][b] (Lionel Bently, ed., 2017).

¹⁰⁶ Regulations for the Implementation, *supra* note 105, art. 3, ¶ 1 (“The term ‘creation’ as referred to in the Copyright Law means intellectual activities in which literary, artistic or scientific works are directly created.”).

¹⁰⁷ See Li, *supra* note 105.

IV. COPYRIGHT AUTHORSHIP AND OWNERSHIP OF THE BLACK HOLE IMAGE

A. *The Case of Visual China Group (VCG)*

VCG, the largest Chinese stock image provider, is similar to Getty Images and owns 500px, a Chinese-owned photo sharing service. On April 10, 2019, it put the black hole image on its platform for sale as soon as the ESO released it. The company watermarked the image with its own logo and a copyright notice and posted a statement saying, “This is an editorial image. Please call 400-818-2525 or consult our customer service representative for commercial use.”¹⁰⁸ According to a news report, “When asked whether the picture belongs to VCG, the rep stated, ‘Yes.’ And when asked whether the image needs to be purchased for use on a poster, the rep replied that it does indeed need to be licensed before it can be used.”¹⁰⁹ This assertion was quickly challenged as copyright infringement by the Chinese netizens who have long been angry with VCG’s practice of watermarking its logo and claiming copyright over other images, such as China’s national flag. Under public pressure, VCG changed its statement to “This is an editorial image and should not be used for commercial purpose”¹¹⁰ and published an apology stating that some of the images were provided by contracted contributors and the company had not fulfilled its responsibility to check them carefully. It also said that it had obtained the nonexclusive rights to the black hole image from the ESO, a claim that the ESO forcefully denied.¹¹¹ Subsequently, VCG took down the “noncompliant photos” and voluntarily shut down its website “for rectification” for a period of time.¹¹²

The foregoing incident raises the following essential questions: Who is the author of the black hole image? Who owns its copyright? Should the image be freely available to the public without any restrictions? The discussion below attempts to answer these questions.

¹⁰⁸ Rita Liao, *China’s largest stock photo provider draws fire over use of black hole image*, TECHCRUNCH (Apr. 12, 2019, 1:19 AM), <https://techcrunch.com/2019/04/11/vcg-black-hole-image> [<https://perma.cc/ME9T-KZ5H>].

¹⁰⁹ Michael Zhang, *500px Owner Slammed for Claiming Copyright to Black Hole Image*, PETAPIXEL (Apr. 12, 2019), <https://petapixel.com/2019/04/12/500px-owner-slammed-for-claiming-copyright-of-black-hole-image> [<https://perma.cc/Q2ZJ-JY3U>].

¹¹⁰ *European Southern Observatory responds to each: Visual China has never contacted us, and has no right to sell black hole copyrights for profit*, NBD (Apr. 12, 2019) [hereinafter *NBD Article*], <http://www.nbd.com.cn/articles/2019-04-12/1320458.html> [<https://perma.cc/T5YT-7HD5>].

¹¹¹ Cai Xuejiao, *Photo Agency Apologizes for Claiming Rights to Black Hole Pic*, SIXTH TONE (Apr. 12, 2019), <https://www.sixthtone.com/news/1003838/photo-agency-apologizes-for-claiming-rights-to-black-hole-pic> [<https://perma.cc/8LMF-8HBU>]; see also *NBD Article*, *supra* note 110.

¹¹² Xuejiao, *supra* note 111.

B. *Who is the Author of the Black Hole Image?*

Many national copyright laws define an “author” as “the person who creates the work.”¹¹³ “Person” often refers to a “natural person,” although some countries also include “legal person,” that is, an organization or company.¹¹⁴ In the U.S., copyright only protects “original works of authorship”¹¹⁵ and the “fruits of intellectual labor” that are “founded in the creative powers of the mind.”¹¹⁶ The U.S. Copyright Office has clearly stated that it “will register an original work of authorship, provided that the work was created by a human being,” and that “the Office will refuse to register a claim if it determines that a human being did not create the work.”¹¹⁷ The Office has also explicitly declared that it “will not register works produced by a machine or mere mechanical process that operates randomly or automatically without any creative input or intervention from a human author.”¹¹⁸ Therefore, a monkey selfie case was dismissed by the court for lack of standing because there was no human author.¹¹⁹ Computer-generated or AI works have not yet been litigated, but the U.S. Copyright Office’s interpretation has clearly ruled out the copyrightability of such works given that they are created by machines or mere mechanical processes. It should be noted, however, that in the case of a “work made for hire (“WMFH”),”¹²⁰ U.S. copyright law deems “the employer or other person for whom the work was prepared” to be the author.¹²¹

¹¹³ Copyright, Designs and Patents Act 1988, c. 48, § 9(1) (Eng.); see Copyright Ordinance, (1997) Cap. 528, 7, § 11(1) (H.K.), <https://www.wipo.int/edocs/lexdocs/laws/en/hk/hk001en.pdf> [<https://perma.cc/D828-KAPJ>]; see also PRC Copyright Law, *supra* note 24, § 2, art. 11(1).

¹¹⁴ For example, pursuant to Article 11 of PRC copyright law, “[w]here a work is created according to the intention and under the supervision and responsibility of a legal entity or other organization, such legal entity or organization shall be deemed to be the author of the work.” PRC Copyright Law, *supra* note 24, § 2, art. 11. Accordingly, “[t]he citizen, legal entity or other organization whose name is mentioned in connection with a work shall, in the absence of proof to the contrary, be deemed to be the author of the work.” *Id.*

¹¹⁵ 17 U.S.C. § 102(a) (2012).

¹¹⁶ *Feist Publ’ns, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 346 (1991).

¹¹⁷ U.S. COPYRIGHT OFFICE, COMPENDIUM OF U.S. COPYRIGHT OFFICE PRACTICES § 306 (3d ed. 2017), <https://www.copyright.gov/comp3/docs/compendium.pdf> [<https://perma.cc/GT96-FHKX>].

¹¹⁸ *Id.* § 313.2.

¹¹⁹ *Naruto v. Slater*, 888 F.3d 418 (9th Cir. 2018).

¹²⁰ Section § 101 defines a “work made for hire” as either: (1) “a work prepared by an employee within the scope of his or her employment” or (2) “a work specially ordered or commissioned for use as a contribution to a collective work, as part of a motion picture or other audiovisual work, as a translation, as a supplementary work, as a compilation, as an instructional text, as a test, as answer material for a test, or as an atlas, if the parties expressly agree in a written instrument signed by them that the work shall be considered a work made for hire.” 17 U.S.C. § 101 (2012).

¹²¹ *Id.* § 201(b), <https://www.govinfo.gov/content/pkg/USCODE-2001-title17/pdf/USCODE-2001-title17-chap2-sec201.pdf> [<https://perma.cc/4DP9-45YT>].

Similarly, the copyright laws of other jurisdictions require the “author” to be a human being.¹²² For example, the U.K., Hong Kong, India, Ireland, and New Zealand have provisions governing “computer-generated works” and define an author as “the person by whom the arrangements necessary for the creation of the work are undertaken.”¹²³ “Computer-generated” work is defined as work that “is generated by computer in circumstances such that there is no human author of the work.”¹²⁴ According to this definition, the author of a computer-generated work is the person who makes “the arrangements necessary for the creation of the work.”¹²⁵ That is, the author is either the programmer who operates the computer or the person who is in charge of the project. Arguably, the entity that sponsors or organizes the project should not be deemed the “author” because the provision uses the word “person,” although such an entity may become an owner of the copyright for work it has sponsored or organized.¹²⁶

In responding to criticism that too much credit has been given to one person in creating the black hole image, Dr. Bouman wrote on Facebook: “No one algorithm or person made this image. It required the amazing talent of a team of scientists from around the globe.”¹²⁷ In addition to Dr. Bouman, more than two hundred other researchers were involved in the project. This poses a challenge to determining the authorship of the image: Are all the people who contributed in one way or another during the creation of the black hole image considered “authors,” or are only those who made the final touches and fixed the image on the medium the authors?

By virtue of the above legal definitions and the unique process of creating the black hole image, this Article proposes to approach the authorship of the black hole image in one of three ways. The first is to leave the black hole image in the public domain so that no one can claim authorship. This is probably the most sensible and practical solution because it would be too difficult to determine who “created” the image and at what stage it was created due to the lengthy process involving so many people. The second way is to award co-authorship to those who

¹²² For example, the UK Copyright, Designs and Patents Act provides that the “‘author’, in relation to a work, means the person who creates it.” Copyright, Designs and Patents Act 1988, c. 48, § 9(1) (Eng.). Similarly, Article 11 of China’s Copyright Law provides that “the author of a work is the citizen who has created the work.” PRC Copyright Law, *supra* note 24, § 2, art. 11.

¹²³ *See, e.g.*, Copyright, Designs and Patents Act 1988, c. 48, § 9(3) (Eng.).

¹²⁴ *Id.* § 178; *see* Copyright Ordinance, (1997) Cap. 528, 8, § 11(3) (H.K.).

¹²⁵ Copyright Ordinance, (1997) Cap. 528, 8, § 11(3) (H.K.).

¹²⁶ *Id.* at 7, § 11(2) (H.K.).

¹²⁷ Sarah Mervosh, *How Katie Bouman Accidentally Became the Face of The Black Hole Project*, N.Y. TIMES (Apr. 11, 2019), <https://www.nytimes.com/2019/04/11/science/katie-bouman-black-hole.html> [https://perma.cc/QR6V-MU3S].

were involved in the final formation of the image, i.e., the programmers who wrote the algorithms to transform and refine the data into the final image. The rationale for this approach is that only expression, not ideas, can be protected by copyright,¹²⁸ and the author must be the person who “create[d]” the work.¹²⁹ The U.S. copyright law states that “[a] work is ‘created’ when it is fixed in a copy or phonorecord for the first time.”¹³⁰ In *Donoghue v. Allied Newspapers Ltd.*, the court said, “If the idea, however original, is nothing more than an idea, and is not put into any form of words, or any form of expression such as a picture, then there is no such thing as copyright at all.”¹³¹ Co-authorship is allowed in common law jurisdictions if “the contribution of each author is not distinct from that of the other author or authors”¹³² or if the authors of the work created it “with the intention that their contributions be merged into inseparable or interdependent parts of a unitary whole.”¹³³ Co-authorship is also allowed in civil law jurisdictions for both inseparable and separable (or compound) works.¹³⁴ The third way to approach authorship is to deem the organizer of the project to be the author under the U.S. doctrine of WMFH.¹³⁵ This approach makes it easier to determine the author, but the problem it creates is two-fold: (1) Some countries do not recognize legal persons as authors; and (2) even in countries that recognize legal persons as authors, it is unclear who was the true organizer for the project of the black hole image, as discussed in the next section.

C. *Who Owns the Copyright of the Black Hole Image?*

In addition to determining authorship, another challenge is to determine the ownership of the copyright for the black hole image. In most situations, copyright can be owned by a “legal person” based on the doctrine of WMFH.¹³⁶ The black hole image will most likely be considered a WMFH that’s copyright is owned by the organizing entity. Due to the involvement of several organizations, there has been some

¹²⁸ See discussion *supra* Section III.A.

¹²⁹ See Copyright, Designs and Patents Act 1988, c. 48, § 9(1) (Eng.).

¹³⁰ 17 U.S.C. § 101 (2012).

¹³¹ *Donoghue v. Allied Newspapers, Ltd.* [1938] 1 Ch. 106 (UK).

¹³² Copyright, Designs and Patents Act 1988, c. 48, § 10(1) (Eng.); see Copyright Ordinance, (1997) Cap. 528, 8, § 12(1) (H.K.).

¹³³ 17 U.S.C. §101.

¹³⁴ See Gesetz über Urheberrecht und verwandte Schutzrechte [UrhG] [Copyright Act], Sept. 9, 1965, BGBl I at 9 (Ger.); see also PRC Copyright Law, *supra* note 24, § 2, art.13.2.

¹³⁵ See generally 17 U.S.C. § 101.

¹³⁶ 17 U.S.C. § 201(b) (“Works Made for Hire. In the case of a work made for hire, the employer or other person for whom the work was prepared is considered the author for purposes of this title, and, unless the parties have expressly agreed otherwise in a written instrument signed by them, owns all of the rights comprised in the copyright.”); see Copyright, Designs and Patents Act 1988, c. 48, § 11(2) (Eng.).

confusion about who is the true and chief organizer of the project, and thus who owns the copyright. In some news reports, the ESO was named as the copyright owner of the black hole image.¹³⁷ However, according to an email reply from the ESO to the Chinese news media about the *VCG* case, the copyright of the image belongs to the EHT collaboration, to which the ESO is subordinated.¹³⁸ The official website of the EHT has a copyright notice claiming “copyright © 2017-2019 Event Horizon Telescope.”¹³⁹ Presumably, the EHT claims copyright to all the content on its website, including the black hole image. The EHT’s website also mentions that the ESO and the NSF are its “partners.”¹⁴⁰ Nevertheless, it is the ESO that licenses the black hole image under the Creative Commons (CC) Attribution 4.0 International License.¹⁴¹ Thus, the questions are: What is the relationship between the EHT and the ESO, and who is the true owner of the copyright? The foregoing situation seems to indicate that the EHT is a virtual entity nominally holding the copyright, whereas, in reality, it is the ESO that owns the copyright. If this is true, what about the NSF or the other “partners,” if any? Can they also license the black hole image as the EHT’s partners? Without clarification from the EHT or the ESO on this issue, confusion over the copyright ownership of the black hole image is certain to occur in the future.

From the *VCG* case, it is clear that the image was licensed by the ESO under the CC Attribution 4.0 International License as follows:

Unless specifically noted, the images, videos, and music distributed on the public ESO website, along with the texts of press releases, announcements, pictures of the week, blog posts and captions, are licensed under a Creative Commons Attribution 4.0 International License, and may on a non-exclusive basis be reproduced without fee

¹³⁷ See, e.g., *China suspends website for black hole copyright*, EFE (Apr. 12, 2019), <https://www.efe.com/efe/english/technology/china-suspends-website-for-black-hole-copyright/50000267-3951037> [<https://perma.cc/UV5Q-EKUB>].

¹³⁸ 每日经济新闻, *欧洲南方天文台回应每经: 视觉中国从未与我们联系, 更无权出售黑洞版权牟利* [*European Southern Observatory responds to each: Visual China has never contacted us, and has no right to sell black hole copyrights for profit*], NBD (Apr. 12, 2019), <http://www.nbd.com.cn/articles/2019-04-12/1320458.html> [<https://perma.cc/T5YT-7HD5>]. Please note that the ESO email reply, featured on NBD’s website, is only available in Chinese.

¹³⁹ *Global Effort to Make First Black Hole Image Wins 2020 Breakthrough Prize in Fundamental Physics*, EVENT HORIZON TELESCOPE, <https://eventhorizontelescope.org> [<https://perma.cc/E3EX-DMFQ>].

¹⁴⁰ *Press Release (April 10, 2019): Astronomers Capture First Image of a Black Hole*, EVENT HORIZON TELESCOPE, <https://eventhorizontelescope.org/press-release-april-10-2019-astronomers-capture-first-image-black-hole> [<https://perma.cc/WDN5-42QH>].

¹⁴¹ *Usage of images, videos, music and web texts*, ESO, <https://www.eso.org/public/copyright> [<https://perma.cc/4DNB-3488>].

provided the credit is clear and visible. Details on how to interpret this are given below for those who need further explanation.¹⁴²

According to this license, VCG and any other users have a right to use the image without notifying or obtaining permission from the ESO, even for a commercial purpose, subject to the clear and visible attribution to the ESO.¹⁴³ If that is the case, what has VCG done wrong by putting the image on its website? It is not that it used the image without permission and for profit. Instead, the problem is that it misrepresented itself as the copyright owner by watermarking its own logo over the black hole image and then lied in claiming that it had obtained the copyright from the ESO.¹⁴⁴ Simply put, VCG infringed the ESO’s (or EHT’s) copyright by putting its logo over the black hole image without showing the ESO’s (or EHT’s) copyright notice. However, according to the CC license, VCG did not need to remove the black hole image from its website after the incident. It could have continued to use the image, even for profit, provided that it put the ESO’s (or EHT’s) clear and visible copyright notice on the image.

V. SHOULD THE BLACK HOLE IMAGE BE PLACED IN THE PUBLIC DOMAIN?

Copyright law has two parallel objectives: to protect the creator’s copyright and to promote public access to creative works.¹⁴⁵ Increasingly, public access to creative works has been viewed as the “ultimate aim” of copyright law.¹⁴⁶ This has been particularly true for works like the black hole image, which was created through global collaboration, financed primarily by government funding, and may lead to a substantial public demand for scientific research and education.¹⁴⁷ This Article argues that

¹⁴² *Id.*

¹⁴³ *Attribution 4.0 International*, CREATIVE COMMONS, <https://creativecommons.org/licenses/by/4.0/legalcode> [<https://perma.cc/W6UD-ALR8>].

¹⁴⁴ See discussion *supra* Section IV.A.

¹⁴⁵ See *Copyright*, WIPO, <http://www.wipo.int/copyright/en/index.html> [<https://perma.cc/SD4Z-7NPD>] (“Copyright law aims to balance the interests of those who create content, with the public interest in having the widest possible access to that content.”).

¹⁴⁶ See *Twentieth Century Music Corp. v. Aiken*, 422 U.S. 151, 156 (1975) (“Creative work is to be encouraged and rewarded, but private motivation must ultimately serve the cause of promoting broad public availability of literature, music, and the other arts. The immediate effect of our copyright law is to secure a fair return for an ‘author’s’ creative labor. But the ultimate aim is, by this incentive, to stimulate artistic creativity for the general public good.”).

¹⁴⁷ See *Arguments for Open Access to Research Results*, I LOVE OPEN ACCESS (Mar. 15, 2013), <http://iloveopenaccess.org/arguments-for-open-access> [<https://perma.cc/WY8K-AHUL>]; see also *Arguments and Reservations*, OPEN ACCESS, <https://open-access.net/en/information-on-open-access/arguments-and-reservations> [<https://perma.cc/DW6Z-MWKU>]; see also Richard Van Noorden, *Arguments over European open-access plan heat up*, NATURE (Nov. 12, 2018), <https://www.nature.com/articles/d41586-018-07386-x> [<https://perma.cc/CPL4-VM7N?type=image>]; see also *The Arguments For Paid, and Open Access Academic Journals*, ULTIUS (June 5,

works of this kind should be left in the public domain to be shared freely in order to promote social, cultural, and scientific progress.

Indeed, some have already suggested that the world's first black hole image should belong to the whole world,¹⁴⁸ an assertion that merits serious consideration. When one considers the process of the image's creation, it is clear that the EHT is an international collaboration with over two hundred researchers who spent more than ten years at eight observation sites on four continents, financed by billions of dollars from the European Research Council (ERC) and the NSF, among other public funding agencies.¹⁴⁹ This project is very similar to the human genome project, in that both of them have worldwide significance and have involved global collaboration and huge public funding. To ensure public access to the research results of that project, in 2000 the former U.S. President Bill Clinton and U.K. Prime Minister Tony Blair issued a joint statement declaring that "raw fundamental data on the human genome, including the human DNA sequence and its variations, should be made freely available to scientists everywhere."¹⁵⁰ The science community at that time generally agreed not to patent a human DNA sequence that had no specific utility.¹⁵¹ The black hole image is also a ground-breaking achievement based on global collaboration and sponsored by public funding. It is therefore not unreasonable to argue that it should be left in the public domain to be freely shared by the public.

One may argue that there is no need to place the image in the public domain because the fair use doctrine, the compulsory licensing regime, and the CC Attribution 4.0 International License are sufficient to enable public access to the image. However, this Article argues that none of these can guarantee steady and long-term public access to the image. First of all, fair use and compulsory licensing work only when the copyrightability and copyright ownership of the work are certain and clear, which is not the case for the black hole image, as discussed above. Second, as broad and generous as it now stands, the CC Attribution 4.0

2018), <https://www.ultius.com/ultius-blog/entry/the-arguments-for-paid-and-open-access-academic-journals.html> [https://perma.cc/CGX6-CSEU].

¹⁴⁸ 视觉中国回应, 黑洞照片的版权问题到底归谁? [visual China responded, who is the copyright issue of black hole photos?], SOHU.COM (Apr. 11, 2019, 14:42 PM), http://www.sohu.com/a/307244728_123977 [https://perma.cc/8VZ8-H5LF].

¹⁴⁹ See, e.g., *Astronomers Capture First Image of a Black Hole*, EUR. S. OBSERVATORY (Apr. 10, 2019), <https://www.eso.org/public/news/eso1907/> [https://perma.cc/PN2N-AANH] (explaining how the European Research Council granted €14 million to the project, and detailing how support from the ESO, IRAM, and the Max Planck Society was forthcoming).

¹⁵⁰ Charles Arthur, *High stakes battle is joined in deciding who owns our genes*, INDEPENDENT (Mar. 16, 2000, 1:00 PM), <https://www.independent.co.uk/news/business/analysis-and-features/high-stakes-battle-is-joined-in-deciding-who-owns-our-genes-283119.html> [https://perma.cc/6LQP-QE97].

¹⁵¹ See *id.*

International License still operates under copyright law. The copyright owner decides the terms of use and can change to a stricter license, among six CC licenses, at any time, to make public access more difficult. Under the public domain framework, on the other hand, the public can avoid such a situation because the public domain allows the public to use works freely without being subjected to any copyright infringement lawsuit or any licensing terms determined by a copyright owner.¹⁵²

It has been argued that a work is in the public domain not only when its protection term has expired, or it has been excluded from copyright protection, but for other reasons. For example, in *Meshwerks*, the court held that “facts and ideas are the public’s domain and open to exploitation to ensure the progress of science and the useful arts.”¹⁵³ Although the black hole image may not be categorized as “facts and ideas” to be excluded from copyright subject matter protection, it may fail to meet the test of originality, which is one of the many categories in the public domain.¹⁵⁴ Public interest could be another reason to leave the black hole image in the public domain.¹⁵⁵ The copyright laws of some jurisdictions allow public interest to be raised as a defense to copyright infringement, thereby placing such works in the public domain. For example, the U.K. Human Rights Act 1998¹⁵⁶ and the PRC Copyright Law have such provisions.¹⁵⁷ It could be argued that, due to the image’s rarity and the global involvement in its creation, there is a public interest in sharing it without any restrictions. Finally, the uncertainty and ambiguity about who, between EHT and ESO, holds the copyright makes it challenging to pinpoint any individual or entity that may be entitled to copyright protection for such an unprecedented human achievement, which further justifies the necessity of placing the black hole image in the public domain for the benefit of the whole humankind.

¹⁵² Yahong Li & Graham Greenleaf, *China’s Copyright Public Domain: A Comparison with Australia*, 27(3) AUSTRALIAN INTELLECTUAL PROPERTY JOURNAL [AUSTL. INTELL. PROP. J.] 147, 161 (2017) (Austl.).

¹⁵³ *Meshwerks, Inc. v. Toyota Motor Sales U.S.A., Inc.*, 528 F.3d 1258, 1266 (10th Cir. 2008).

¹⁵⁴ Li & Greenleaf, *supra* note 152, at 151.

¹⁵⁵ *Id.* at 159-61.

¹⁵⁶ RONAN DEAZLEY, *RETHINKING COPYRIGHT: HISTORY, THEORY, LANGUAGE* 116 (2006) (explaining that “the notion that the courts can authorize the use of a work which would otherwise amount to copyright infringement (so long as that use can be considered to be in the public interest)” had a “tentative” foundation in *Lion Laboratories v. Evans* but has “received a more substantive and coherent rationale with the coming into force of Human Rights Act 1998 and the decision of the Court of Appeal in *Ashdown v.[.] Telegraph Group*”); see JAMES BOYLE, *THE PUBLIC DOMAIN: ENCLOSING THE COMMONS OF THE MIND* 160 (2008).

¹⁵⁷ PRC Copyright Law, *supra* note 24, art. 4 (“Copyright owners, in exercising their copyright, shall not violate the Constitution or laws or infringe upon the public interests”).

CONCLUSION

As a ground-breaking human achievement, the black hole image immediately attracted global attention and created a copyright dispute. Nevertheless, no follow-up study has yet been done on why the dispute occurred. Nor has anyone yet inquired as to what specific issues might have potentially been litigated if the dispute had gone to court or could be litigated if similar disputes occur in the future, despite the scattered news reports and shallow analyses. This Article fills that void. Specifically, it has identified multiple unsettled copyright issues concerning the black hole image and has proposed some conclusions and suggestions based on the analyses of these issues.

First, although the image was created from data telescopically collected and converted by a computer, it is not a fact or an idea but a fixed expression of a scientific domain eligible for copyright protection. Second, the image is not a database or a computer-generated work. It is a photographic work that must be examined for its originality. The originality was carefully analyzed in scenarios involving “reality photos,” satellite photographs such as Google’s street maps and NASA’s “Blue Marble,” and “digital modeling.” The analyses suggested that, as a truthful depiction of the black hole, the image could fail the originality test under the “minimum creativity” requirement in the U.S., but it might pass the lower hurdle for originality under the U.K. “sweat of the brow” doctrine or the laws of other jurisdictions such as Canada, France, and China that take human labor, skill, judgment, and investment into account. Third, it would be somewhat difficult, if not impossible, to determine who authored the image, and who, between the ETH and the ESO, owns the copyright.

This Article argues that there is a compelling public interest in accessing and using the black hole image, not only because copyright law has the built-in objective of promoting public access to creative works (in addition to protecting the creator’s rights), but also because the black hole image is the world’s first and only image of a black hole and was created through a broad international collaboration with substantial public funding. This very objective of copyright and the public interest in accessing the image could only be achieved by leaving the black hole image in the public domain without copyright protection. The fair use doctrine and compulsory licensing are not helpful in this case due to the uncertainty and confusion about the image’s copyrightability and copyright ownership. Neither is the CC Attribution 4.0 International License helpful because it operates subject to copyright law and, therefore, can be changed by the copyright holder to a more restrictive license at any time, making public access more difficult and uncertain.

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This Article concludes that leaving the black hole image in the public domain can better achieve copyright’s ultimate objective of increasing public access to creative works, thereby promoting social, cultural, and scientific progress.