



CARDOZO

Benjamin N. Cardozo School of Law

LARC @ Cardozo Law

Cardozo Law Review de•novo

Scholarship

2021

A Tale of Two Interoperabilities; Or, How *Google v. Oracle* Could Become Social Media Legislation

Charles Duan

American University Washington College of Law

Follow this and additional works at: <https://larc.cardozo.yu.edu/de-novo>



Part of the [Law Commons](#)

Recommended Citation

Duan, Charles, "A Tale of Two Interoperabilities; Or, How *Google v. Oracle* Could Become Social Media Legislation" (2021). *Cardozo Law Review de•novo*. 84.

<https://larc.cardozo.yu.edu/de-novo/84>

This Article is brought to you for free and open access by the Scholarship at LARC @ Cardozo Law. It has been accepted for inclusion in Cardozo Law Review de•novo by an authorized administrator of LARC @ Cardozo Law. For more information, please contact larc@yu.edu.

CARDOZO LAW REVIEW
de•novo

A TALE OF TWO INTEROPERABILITIES; OR, HOW
GOOGLE V. ORACLE COULD BECOME SOCIAL
MEDIA LEGISLATION

Charles Duan[†]

The Supreme Court’s recent decision in Google LLC v. Oracle America, Inc. has provided the latest word on an issue that many have described as “interoperability,” and it comes at a time when lawmakers around the world are debating a policy called “interoperability” with respect to major Internet platforms. At first glance, these two similarly named policy conversations—copyright protection of software interfaces and interconnection among competing Internet platforms, respectively—have little to do with each other. Yet they are vitally intertwined: the activities and issues featured in Google are so closely linked to the questions of digital competition that interoperability reforms directed to the latter cannot be achieved effectively without also addressing the former.

This close tie between two aspects of interoperability has a perhaps surprising implication: Congress can and should expand upon the recent Google decision as part of its larger efforts to induce competition in the social media and major

[†] Senior policy fellow, Program on Information Justice and Intellectual Property, American University Washington College of Law; senior fellow for technology and innovation policy, R Street Institute. The author was counsel of record on the brief of amici curiae the R Street Institute, Public Knowledge, and the Niskanen Center, which the Supreme Court quoted in its *Google LLC v. Oracle America, Inc.* decision. See 141 S. Ct. 1183, 1203–04 (2021). I would like to thank Clark Asay, Jon Band, Zach Graves, James Grimmelman, Eric Stallman, Ali Sternburg, and counsel involved with the litigation for their thoughts and comments that contributed to the content of this Article, as well as the editors of the *Cardozo Law Review de•novo*. All errors are my own.

technology platform markets. Barriers to replication of software interfaces, such as copyrights in Google, can stymie the robustly competitive digital landscape that lawmakers hope to achieve through interoperability legislation. Drawing from history and current policy, this Article proposes ways that Congress can respond to the Google decision, ranging from developing copyright-free government standards to revising the Copyright Act.

INTRODUCTION	248
I. INTERCONNECTION: TELEPHONE NETWORKS AND SOCIAL MEDIA	251
A. <i>Historic Telephone Interconnection</i>	251
B. <i>Interconnection and Social Media</i>	252
II. REIMPLEMENTATION: <i>GOOGLE</i> AND SOFTWARE INTERFACES.....	253
A. <i>The Facts of Google</i>	254
B. <i>History of Reimplementation</i>	255
C. <i>The Supreme Court Decision and Remaining Questions</i>	256
D. <i>Other Barriers to Reimplementation</i>	257
III. INTERCONNECTION REQUIRES REIMPLEMENTATION	258
A. <i>Horizontal and Vertical Interconnection</i>	259
B. <i>Reimplementation and Vertical Interconnection</i>	259
C. <i>Reimplementation and Horizontal Interconnection</i>	260
IV. IMPLEMENTING REIMPLEMENTATION	261
A. <i>Case Studies</i>	261
1. <i>Power Frequencies</i>	261
2. <i>Digital Television</i>	262
3. <i>Electronic Health Records</i>	263
B. <i>Legislative Options</i>	264
1. <i>Government-Adopted Standards</i>	264
2. <i>Conditions upon Regulated Firms</i>	266
3. <i>Legislating on Software Copyrights</i>	267
CONCLUSION	268

INTRODUCTION

“You keep using that word. I do not think it means what you think it means.”¹ It would not be inconceivable to say such of “interoperability,” a term notoriously difficult to define.² Indeed, the term is central to two important contemporary issues of legal policy that seemingly have nothing to do with each other and use interoperability to mean apparently different things.

The first of these issues is a matter of computer software and copyright law. In its recent decision in *Google LLC v. Oracle America, Inc.*, the Supreme Court grappled with whether Google, in building its Android mobile platform, was allowed to copy certain portions of computer code from the Java programming language.³ The portions of Java that Google copied were not arbitrary, but were specifically selected to help knowledgeable Java programmers transition more easily to writing for the Android platform.⁴ Insofar as this copyright question involved the ability of programmers and their code to operate between (inter-) two different platforms, commentators have widely described the case and the related software copyright question generally as a matter of interoperability.⁵

At nearly the same time, lawmakers and policy experts around the world have debated another idea called interoperability: regulatory requirements that dominant Internet platforms, especially in social media, enable rival firms to connect with those platforms, thereby enabling greater competition.⁶ A notable example is the recent report from the staff

¹ THE PRINCESS BRIDE 16:32 (Twentieth Century Fox Film Corp. 1987).

² See, e.g., Wolfgang Kerber & Heike Schweitzer, *Interoperability in the Digital Economy*, 8 J. INTELL. PROP. INFO. TECH. & ELEC. COM. L. 39, 40–41 (2017); JOHN PALFREY & URS GASSER, INTEROP: THE PROMISE AND PERILS OF HIGHLY INTERCONNECTED SYSTEMS 5 (2012).

³ See *Google LLC v. Oracle Am., Inc.*, 141 S. Ct. 1183, 1190–95 (2021); *infra* Section II.

⁴ See *Google*, 141 S. Ct. at 1193–94.

⁵ See, e.g., Rina Diane Caballar, *Google v. Oracle Explained: The Fight for Interoperable Software*, IEEE SPECTRUM (Feb. 19, 2020), <https://spectrum.ieee.org/tech-talk/computing/software/google-v-oracle-explained-supreme-court-news-apis-software> [<https://perma.cc/CN8V-PB8B>]; Joseph Gratz & Mark A. Lemley, *Platforms and Interoperability in Oracle v. Google*, 31 HARV. J.L. & TECH. 603 (2018); Peter S. Menell, *Rise of the API Copyright Dead?: An Updated Epitaph for Copyright Protection of Network and Functional Features of Computer Software*, 31 HARV. J.L. & TECH. 305, 448 (2018) (“Nearly every major litigation from *Apple v. Franklin* in 1983 through the *Oracle v. Google* litigation involves interoperability issues.”).

⁶ See, e.g., Chris Riley, *Unpacking Interoperability in Competition*, 5 J. CYBER POL’Y 94, 94–95 (2020) (“[T]he future direction of regulatory travel will be towards the promotion of interoperability.”); BECKY CHAO & ROSS SCHULMAN, PROMOTING PLATFORM INTEROPERABILITY 6–7 (New Am.’s Open Tech. Inst. 2020), <http://newamerica.org/oti/reports/>

of the House Judiciary Committee, proposing “[a]n interoperability requirement [that] would allow competing social networking platforms to interconnect with dominant firms to ensure that users can communicate across services.”⁷ Such a requirement, characteristic of other interoperability proposals,⁸ “breaks the power of network effects” that entrench dominant digital platforms and thus enables greater competition, as the report contends.⁹

Despite sharing common terminology, these two policy issues have not been recognized as connected in either policy debates or scholarly literature. Recent commentary on digital platform interoperability rarely notes software copyrights as a relevant concern.¹⁰ While research on software copyrights recognizes competition concerns at a high level, the connection to contemporary social media and digital platform regulation

promoting-platform-interoperability [https://perma.cc/QL8T-7RA8]; IAN BROWN, INTEROPERABILITY AS A TOOL FOR COMPETITION REGULATION 5 (OpenForum Acad. 2020), https://osf.io/preprints/lawarxiv/fbvxd [https://perma.cc/Y6YE-ZXGZ].

⁷ MAJORITY STAFF OF SUBCOMM. ON ANTITRUST, COM. & ADMIN. L., HOUSE JUDICIARY COMM., 116TH CONG., INVESTIGATION OF COMPETITION IN DIGITAL MARKETS 385 (2020) [hereinafter HOUSE JUDICIARY REPORT], https://judiciary.house.gov/uploadedfiles/competition_in_digital_markets.pdf [https://perma.cc/CU7K-TAUR].

⁸ See *infra* notes 27–34 and accompanying text (reviewing proposals).

⁹ HOUSE JUDICIARY REPORT, *supra* note 7, at 385 (quoting Michael Kades & Fiona Scott Morton, *Interoperability as a Competition Remedy for Digital Networks* 13–14 (Wash. Ctr. for Equitable Growth, working paper, Sept. 2020), https://equitablegrowth.org/working-papers/interoperability-as-a-competition-remedy-for-digital-networks [https://perma.cc/XT68-XPBG]).

¹⁰ See, e.g., Thomas E. Kadri, *Digital Gatekeepers*, 99 TEX. L. REV. 951, 997 & n.254 (2021) (noting role of the Digital Millennium Copyright Act, which is related to but distinct from copyright law); Filippo Lancieri & Patricia Morita Sakowski, *Competition in Digital Markets: A Review of Expert Reports*, 26 STAN. J.L. BUS. & FIN. 65, 155–56 (2021) (discussing privacy and regulatory effectiveness as primary concerns for platform interoperability); Stanley M. Besen & Philip L. Verveer, *Competition and Data: Potential Remedies*, 21 WAKE FOREST J. BUS. & INTELL. PROP. L. 102, 142 (2021) (focusing on technical and regulatory issues); Mathew Heim & Igor Nikolic, *A FRAND Regime for Dominant Digital Platforms*, 10 J. INTELL. PROP. INFO. TECH. & ELEC. COM. L. 38, 50–55 (2019) (proposing an interoperability arrangement analogous to certain patent licensing); Konstantinos Stylianou, *Exclusion in Digital Markets*, 24 MICH. TELECOMM. & TECH. L. REV. 181, 226–27 (2018) (noting relevance of “compatibility” without identifying particular barriers thereto). One commentator observes that copyright protection did play a substantial role in a historical monopolization dispute over telephone books. See Erika M. Douglas, *Monopolization Remedies and Data Privacy*, 24 VA. J.L. & TECH. 1, 47–53 (2020). However, she does not propose a role for copyright law with respect to contemporary digital platform competition issues. *Id.* at 68–73. Others generally recommend an “open” technical standard for platform interoperability. See, e.g., Riley, *supra* note 6, at 99–100; Kades & Scott Morton, *supra* note 9, at 23–24. However, even “open” technical standards often still fail to address questions of software copyrights. See RUDI BEKKERS & ANDREW UPDEGROVE, A STUDY OF IPR POLICIES AND PRACTICES OF A REPRESENTATIVE GROUP OF STANDARDS SETTING ORGANIZATIONS WORLDWIDE 36 (2012) (commissioned paper preparatory to NAT’L ACAD. OF SCIS., PATENT CHALLENGES FOR STANDARD-SETTING IN THE GLOBAL ECONOMY (Keith Maskus & Stephen A. Merrill eds., 2013)); Charles Duan, *Internet of Infringing Things: The Effect of Computer Interface Copyrights on Technology Standards*, 45 RUTGERS COMPUT. & TECH. L.J. 1, 31–32 (2019).

has not been strongly made.¹¹ Indeed, critics of the Supreme Court's *Google* decision claim that it will entrench dominant Internet platforms, apparently setting the first type of interoperability at cross-purposes with the second.¹²

Yet, I contend they are closely tied. Interoperability in the social media sense, often also called "interconnection," can only achieve the objectives that lawmakers seek if it is legislated in tandem with interoperability in the *Google* sense, otherwise called "reimplementation." The complex relationships among participants in digital markets mean that interconnection requirements alone will not undo—and in fact may entrench—monopoly power; a serious approach to competition requires a digital ecosystem that can only be achieved if reimplementation is permitted unfettered.¹³

Corollary to the dual nature of interoperability is the perhaps surprising possibility that lawmakers ought to be motivated to expand upon the Supreme Court's decision through legislation, given their interest in digital platform interconnection.¹⁴ History shows that addressing both reimplementation and interconnection is not only

¹¹ See, e.g., Peter S. Menell, *Economic Analysis of Network Effects and Intellectual Property*, 34 BERKELEY TECH. L.J. 219, 322 (2019) (describing implications of intellectual property for social media platform competition as a future research direction); Pamela Samuelson, *Fair Use Prevails in Oracle v. Google*, COMM'NS ACM, Nov. 2016, at 24, 26; Mark A. Lemley & Mark P. McKenna, *Unfair Disruption*, 100 B.U. L. REV. 71, 95 (2020); Keith N. Hylton, *Digital Platforms and Antitrust Law*, 98 NEB. L. REV. 272, 283 n.28 (2019) (noting possible relevance of *Google* to a different question of platform competition, namely startup acquisitions). The closest article, focusing primarily on European law, notes that "[c]opyrightability of APIs may indirectly affect the competition policy in software dependent markets" and cites to *Google*, but provides little further analysis of the case or the application of copyright law. Jörg Hoffmann & Begoña Gonzalez Otero, *Demystifying the Role of Data Interoperability in the Access and Sharing Debate*, 11 J. INTEL. PROP. INFO. TECH. & ELEC. COM. L. 252, 273 (2020).

¹² See, e.g., Press Release, Oracle Statement Regarding *Oracle v. Google* (Apr. 5, 2021), <https://www.oracle.com/news/announcement/oracle-statement-regarding-oracle-v-google-040521.html> [<https://perma.cc/7WMH-TMPD>] (claiming that with the decision, "[t]he Google platform just got bigger and market power greater").

¹³ See *infra* Section III.

¹⁴ Cf. Andy Halaby, *Valley IP Attorney Highlights Key Patent Cases to Watch in 2021*, PHX. BUS. J. (Nov. 24, 2020), <https://www.bizjournals.com/phoenix/news/2020/11/24/my-view-key-patent-cases-to-watch-in-2021.html> [<https://perma.cc/E69M-6M5U>] (predicting that "meaningful IP legislation probably is unlikely" after describing the case); Bob Goodlatte, *Supreme Court Could Take Intellectual Property Protections Back 50 Years*, NEWSWEEK (Sept. 24, 2020), <https://www.newsweek.com/supreme-court-could-take-intellectual-property-protections-back-50-years-opinion-1533942> [<https://perma.cc/N8DR-6EGY>] (former House Judiciary Committee chair advocating on the case but not calling for legislation). The only other mention of post-*Google* legislation that I found was a brief Congressional Research Service report noting that "Congress thus has the power to change the scope of software copyright should it disagree with the decision in *Google v. Oracle*" but not specifically seeking such legislation. KEVIN J. HICKEY, CONG. RSCH. SERV., LSB10543, COPYRIGHT IN CODE: SUPREME COURT HEARS LANDMARK SOFTWARE CASE IN *GOOGLE V. ORACLE* 4 (2020), <https://www.hsdl.org/?view&did=846248>.

possible but in fact common, and legislators have a range of options to do so.¹⁵

I. INTERCONNECTION: TELEPHONE NETWORKS AND SOCIAL MEDIA

In the context of communications law and more recently social media platform policy, interoperability generally refers to the ability of third-party services to communicate with an existing, often dominant platform or system.¹⁶ I will use the term “interconnection” to refer to this arrangement.¹⁷

A. *Historic Telephone Interconnection*

Interconnection has long been a matter of concern for telephone networks.¹⁸ The earliest telephone networks notably did not feature interconnection: the dominant Bell network was not connected to its so-called “independent” competitor networks, and one who wanted service from both Bell and an independent needed to have two separate wires and two separate telephone handsets.¹⁹

Dissatisfaction with the duplicative nature of the telephone networks led to the 1913 Kingsbury Commitment, in which AT&T agreed to a limited amount of interconnection where independents could place (but not receive) calls over AT&T’s long distance wires.²⁰ While contemporaries hailed the commitment as a win for competition, the limited interconnection that AT&T offered in fact increased the company’s monopoly control, ultimately leading to the demise of most of the independents.²¹ Interconnection was subsequently seen as a component of deregulation of the telephone industry in the 1980s, the theory being that opening up AT&T’s networks to calls to and from rival

¹⁵ See *infra* Section IV.

¹⁶ See, e.g., HOUSE JUDICIARY REPORT, *supra* note 7, at 385.

¹⁷ To be clear, “interconnection” is a statutory term of art in telecommunications law and is defined by regulation. See 47 U.S.C. § 251(a)(1); 47 C.F.R. § 51.5 (2021). That narrower, more formal term is not what I intend, although interconnection in telecommunications law is certainly an instance of interconnection as I intend the term.

¹⁸ See generally Philip J. Weiser, *Regulating Interoperability: Lessons from AT&T, Microsoft, and Beyond*, 76 ANTITRUST L.J. 271, 274–79 (2009).

¹⁹ See MILTON MUELLER, UNIVERSAL SERVICE: COMPETITION, INTERCONNECTION AND MONOPOLY IN THE MAKING OF THE AMERICAN TELEPHONE SYSTEM 81–88 (digit. ed. 2013), <https://surface.syr.edu/books/18> [<https://perma.cc/DG3R-6CHT>].

²⁰ See *id.* at 128–30; JONATHAN E. NUECHTERLEIN & PHILIP J. WEISER, DIGITAL CROSSROADS: AMERICAN TELECOMMUNICATIONS POLICY IN THE INTERNET AGE 6 (2005).

²¹ See MUELLER, *supra* note 19, at 128–30.

networks would enable competition and reduce the need for monopoly regulation in the industry.²²

B. *Interconnection and Social Media*

More recently, interconnection has become a key part of the debate over social media and Internet platform dominance. In view of widespread perceptions that digital platforms have become extremely concentrated,²³ policymakers and commentators have called to limit the top firms' power either through application of antitrust law or with new legislation.²⁴

Often comparing those platforms to AT&T's dominant telephone network, many commentators consider interconnection to be a potential solution.²⁵ By way of example, a dominant social media platform might be required under such regulations to allow competitors to send and receive email-like messages between their respective users.²⁶ To do so, the dominant platform would have to open itself up to competitors' transmissions in much the same way that AT&T opened itself up to telephone call transmissions from competitors.

Governments around the world are giving extensive attention to interoperability. A report commissioned by the European Commission Directorate-General for Competition deals extensively with

²² See NUCHECHTERLEIN & WEISER, *supra* note 20, at 67–68; Kevin Werbach, *Only Connect*, 22 BERKELEY TECH. L.J. 1233, 1257–61 (2007).

²³ Whether this is so is a matter of debate. Compare HOUSE JUDICIARY REPORT, *supra* note 7, at 11–12, and STIGLER CTR. FOR THE STUDY OF THE ECON. & THE STATE, STIGLER COMMITTEE ON DIGITAL PLATFORMS: FINAL REPORT 7 (2019), <https://www.chicagobooth.edu/-/media/research/stigler/pdfs/digital-platforms---committee-report---stigler-center.pdf> [<https://perma.cc/G5HF-EM2X>] (“Digital Platforms tend to [be] monopolies . . .”), with Jonathan Klick, *Is the Digital Economy Too Concentrated?*, in THE GLOBAL ANTITRUST INSTITUTE REPORT ON THE DIGITAL ECONOMY 413, 416–17 (Joshua D. Wright & Douglas H. Ginsburg eds., 2020), https://gaidigitalreport.com/wp-content/uploads/2020/11/The-Global-Antitrust-Institute-Report-on-the-Digital-Economy_Final.pdf [<https://perma.cc/29TG-TJUT>] (disputing that technology markets are highly concentrated). Resolving that question is irrelevant here; it is enough that perceptions of market concentration have driven interest in legislation.

²⁴ See HOUSE JUDICIARY REPORT, *supra* note 7, at 20–21; STIGLER CTR. FOR THE STUDY OF THE ECON. & THE STATE, *supra* note 23, at 16–21; Rory Van Loo, *In Defense of Breakups: Administering a “Radical” Remedy*, 105 CORNELL L. REV. 1955, 1956–57, 1957 n.2 (2020).

²⁵ See, e.g., HAROLD FELD, THE CASE FOR THE DIGITAL PLATFORM ACT: MARKET STRUCTURE AND REGULATION OF DIGITAL PLATFORMS 62–66 (2019), https://www.publicknowledge.org/wp-content/uploads/2019/09/Case_for_the_Digital_Platform_Act_Harold_Feld_2019.pdf [<https://perma.cc/PG8J-RCXH>]; Kades & Scott Morton, *supra* note 9, at 12–14; STIGLER CTR. FOR THE STUDY OF THE ECON. & THE STATE, *supra* note 23, at 16.

²⁶ A good discussion of this example is found in BROWN, *supra* note 6, at 7–14.

interoperability policy,²⁷ and E.U. Commissioner for Competition Margrethe Vestager indicated that she would take the report's recommendations under close advisement.²⁸ The U.K. Competition and Markets Bureau has also investigated interoperability in depth,²⁹ as has the House Judiciary Committee.³⁰ Several members of Congress have cosponsored legislation to mandate interconnection by major social media platforms.³¹ And the omnibus privacy laws in Europe³² and California³³ both include provisions on data portability, a rudimentary form of interconnection insofar as data can flow from one platform to a competitor, albeit slowly in the hands of end users.³⁴ Interoperability in the sense of interconnection is thus high on the agenda of many legislators interested in competition and technology.

II. REIMPLEMENTATION: *GOOGLE* AND SOFTWARE INTERFACES

A seemingly different type of interoperability is at play in the world of software copyrights and the *Google* case: reimplementation, a particular form of copying in order to enable compatibility. As the Supreme Court defined the term, reimplementation is “the building of a system that repurposes the same words and syntaxes of an existing

²⁷ See JACQUES CRÉMER, YVES-ALEXANDRE DE MONTJOYE & HEIKE SCHWEITZER, COMPETITION POLICY FOR THE DIGITAL ERA 58–60 (Eur. Comm'n Dir.-Gen. for Competition 2019), <https://ec.europa.eu/competition/publications/reports/kd0419345enn.pdf> [<https://perma.cc/RM34-DRKF>].

²⁸ See Margrethe Vestager, Eur. Comm'r for Competition, Address at the European Consumer and Competition Day: Defending Competition in a Digitised World (Apr. 4, 2019), https://wayback.archive-it.org/12090/20191129202059/https://ec.europa.eu/commission/commissioners/2014-2019/vestager/announcements/defending-competition-digitised-world_en [<https://perma.cc/6EWG-NG5E>].

²⁹ See COMPETITION & MKTS. AUTH., ONLINE PLATFORMS AND DIGITAL ADVERTISING: MARKET STUDY FINAL REPORT paras. 92–93, at 26 (2020) (U.K.), https://assets.publishing.service.gov.uk/media/5fa557668fa8f5788db46efc/Final_report_Digital_ALT_TEXT.pdf [<https://perma.cc/9QD4-DMMP>].

³⁰ See HOUSE JUDICIARY REPORT, *supra* note 7, at 384–86.

³¹ See Augmenting Compatibility and Competition by Enabling Service Switching Act of 2019 (ACCESS Act), S. 2658, 116th Cong. § 4(a) (as introduced in Senate, Oct. 22, 2019), <https://www.congress.gov/bill/116th-congress/senate-bill/2658>.

³² See Parliament & Council Regulation 2016/679 (GDPR), arts. 15.1, 20.1, 2016 O.J. (L 119) 43, 45.

³³ See California Consumer Privacy Act of 2018, CAL. CIV. CODE § 1798.100(a) (2021).

³⁴ See Paul De Hert, Vagelis Papakonstantinou, Gianclaudio Malgieri, Laurent Beslay & Ignacio Sanchez, *The Right to Data Portability in the GDPR: Towards User-Centric Interoperability of Digital Services*, 34 COMPUT. L. & SEC. REV. 193, 194 (2018).

system,” such that users of the existing system can switch over to the new one with minimal effort.³⁵

A. *The Facts of Google*

The facts of *Google* highlight what reimplementation is and, more importantly, why it happens.³⁶ Oracle is the successor in ownership to a collection of computer software programs called the Java API, which is capable of accepting various commands to perform certain useful computations.³⁷ So that third-party programs can invoke these computations, Oracle’s software lays out specific expectations for what those programs must include—names of commands, filing labels called “packages” organizing those commands, what information needs to be given for each command, what the program should expect to get back from the command, and so on.³⁸ These expectations are set forth in a terse, precise, well-defined language, which when written out are what the litigants have described as “declaring code.”³⁹

Google, in developing its Android mobile phone platform, wanted to allow programmers to command its platform to perform computations similar to parts of the Java API.⁴⁰ To do so, Google also needed to lay out its expectations for how to invoke those computations in declaring code.⁴¹ Google wrote its declaring code in parts to be nearly identical to those in Oracle’s software, so that programmers experienced with the Java API could also write for Android with minimal or perhaps no changes to their expectations and preexisting knowledge.⁴²

³⁵ *Google LLC v. Oracle Am., Inc.*, 141 S. Ct. 1183, 1203 (2021) (alterations and quotations omitted) (quoting Brief of the R Street Inst. et al. as Amici Curiae in Support of Petitioner at 2, *Google*, 141 S. Ct. 1183 (No. 18-956), 2020 WL 242502, https://www.supremecourt.gov/DocketPDF/18/18-956/128410/20200113155314297_brief-gvo-merits.pdf [<https://perma.cc/BAP7-CDYG>]).

³⁶ See generally *Google*, 141 S. Ct. at 1190–95; *Oracle Am., Inc. v. Google Inc. (Oracle I)*, 872 F. Supp. 2d 974, 977–83 (N.D. Cal. 2012), *rev’d*, 750 F.3d 1339 (Fed. Cir. 2014); *Oracle Am., Inc. v. Google Inc. (Oracle II)*, 750 F.3d 1339, 1381 (Fed. Cir. 2014). For a history of the litigation between Oracle and Google, see generally Peter S. Menell, *API Copyrightability Bleak House: Unraveling and Repairing the Oracle v. Google Jurisdictional Mess*, 31 BERKELEY TECH. L.J. 1515, 1549–62 (2016).

³⁷ See *Google*, 141 S. Ct. at 1190; *Oracle I*, 872 F. Supp. 2d at 979–82; *Oracle II*, 750 F.3d at 1349–50.

³⁸ See *Google*, 141 S. Ct. at 1191.

³⁹ See *id.* at 1192.

⁴⁰ See *id.* at 1191.

⁴¹ See *id.* at 1193.

⁴² See *id.* at 1193–94.

Google thus built a system “that repurposes the same words and syntaxes’ of an existing system,”⁴³ namely the declaring code of the Java API, to ensure that other, external users or programs could switch between the two. The command words, symbols, and syntaxes that enable communication between a system like the Java API and its users are what computer scientists call an “interface,”⁴⁴ and copying interfaces to facilitate third-party switching is the heart of reimplementation.

B. History of Reimplementation

Like interconnection, reimplementation has a storied history. Coded symbols for issuing commands have existed at least since Aeneas Tacitus described the hydraulic telegraph in the fourth century B.C.,⁴⁵ and reimplementation of command symbol systems can be found everywhere from naval flag signaling to telegraph ciphers to hospital color codes.⁴⁶ More recently, modern Internet technical standards are systems of command words that are reimplemented in ways legally indistinguishable from Google’s acts in *Google*.⁴⁷ Indeed, Oracle itself has reimplemented interfaces devised by IBM and Amazon, both times to enable users of those firms’ dominant technologies to switch over to Oracle’s competing products with minimal disruption.⁴⁸

Courts have struggled mightily on the question of whether reimplementation is copyright infringement. *Baker v. Selden*, the seminal case on the idea-expression dichotomy, is arguably a reimplementation case insofar as Baker’s copies of Selden’s accounting forms enabled accountants familiar with the latter forms to also fill the former.⁴⁹ *Mitel, Inc. v. Iqtel, Inc.* involved a system of numerical codes that defined commands to a telephone calling system, which the Tenth Circuit found

⁴³ *Id.* at 1203 (quoting Brief of the R Street Inst. et al. as Amici Curiae in Support of Petitioner, *supra* note 35, at 2).

⁴⁴ See, e.g., ANDREW S. TANENBAUM, MODERN OPERATING SYSTEMS 44 (2d ed. 2001).

⁴⁵ See 4 POLYBIUS, THE HISTORIES 10.43–46, at 207–19 (W.R. Paton trans., W. Heinemann 1925) (c. 150 A.D.), <https://catalog.hathitrust.org/Record/001181795> [<https://perma.cc/5G96-G9AZ>]; Massimo Guarnieri, *A Historical Survey on Light Technologies*, 6 IEEE ACCESS 25881, 25882 (2018).

⁴⁶ See generally Brief of the R Street Inst. et al. as Amici Curiae in Support of Petitioner, *supra* note 35, at 6–15 (citing sources).

⁴⁷ See Duan, *supra* note 10, at 11–21.

⁴⁸ See Timothy B. Lee, *Before It Sued Google for Copying from Java, Oracle Got Rich Copying IBM’s SQL*, ARS TECHNICA (Mar. 10, 2020), <https://arstechnica.com/tech-policy/2020/03/before-it-sued-google-for-copying-from-java-oracle-got-rich-copying-ibms-sql> [<https://perma.cc/33VC-KTQD>]; Charles Duan, *Oracle Copied Amazon’s API—Was That Copyright Infringement?*, ARS TECHNICA (Jan. 3, 2020), <https://arstechnica.com/tech-policy/2020/01/oracle-copied-amazons-api-was-that-copyright-infringement> [<https://perma.cc/YV5D-AAS7>].

⁴⁹ See *Baker v. Selden*, 101 U.S. 99, 102 (1879).

not copyrightable;⁵⁰ *Practice Management Information Corp. v. American Medical Ass'n* involved a system of numerical codes that defined commands for medical insurance reimbursement, which the Ninth Circuit held copyrightable.⁵¹ *Lotus Development Corp. v. Borland International, Inc.* offered an ideal opportunity to resolve the question, as the case involved a claim of copyright to a spreadsheet program's menu command names that programmers could use to automate data processing.⁵² The First Circuit rejected the copyright claim,⁵³ but on a granted certiorari petition the Supreme Court split four-to-four and established no precedential opinion on the question.⁵⁴

C. *The Supreme Court Decision and Remaining Questions*

Google is the latest word on whether reimplementation is copyright infringement. The case presented two questions based on separate decisions of the Federal Circuit:⁵⁵ whether the declaring code was proper subject matter for copyright protection in view of 17 U.S.C. § 102(b), as the Federal Circuit held;⁵⁶ and whether Google's reimplementation of it for Android was fair use, contrary to the Federal Circuit's holding that it was "not fair as a matter of law."⁵⁷ The Court declined to address the former question,⁵⁸ and resolved the latter in favor of Google, holding its act of reimplementation to be fair use "as a matter of law."⁵⁹

As an initial matter, the majority opinion by Justice Breyer observed that fair use has "an important role in determining the lawful scope of a computer program copyright," and that fair use serves a "basic purpose of providing a context-based check that can help to keep a copyright monopoly within its lawful bounds."⁶⁰ Turning to the four statutory factors for fair use under 17 U.S.C. § 107, the Court found that they all favored fair use, largely relying on the fact that the declaring code's value lay in programmers' investment of time to learn the names of commands

⁵⁰ See *Mitel, Inc. v. Iqtel, Inc.*, 124 F.3d 1366, 1368–70, 1376 (10th Cir. 1997).

⁵¹ See *Prac. Mgmt. Info. Corp. v. Am. Med. Ass'n*, 121 F.3d 516, 517–18, 520 n.8 (9th Cir. 1997), amended by 133 F.3d 1140 (9th Cir. 1998).

⁵² See *Lotus Dev. Corp. v. Borland Int'l, Inc.*, 49 F.3d 807, 809–10 (1st Cir. 1995), *aff'd by an equally divided Court*, 516 U.S. 233 (1996) (per curiam).

⁵³ See *id.* at 819.

⁵⁴ See *Lotus Dev.*, 516 U.S. 233.

⁵⁵ See *Google LLC v. Oracle Am., Inc.*, 141 S. Ct. 1183, 1194–95 (2021).

⁵⁶ See *Oracle II*, 750 F.3d 1339, 1381 (Fed. Cir. 2014).

⁵⁷ *Oracle Am., Inc. v. Google LLC*, 886 F.3d 1179, 1210 (Fed. Cir. 2018).

⁵⁸ See *Google*, 141 S. Ct. at 1197.

⁵⁹ *Id.* at 1209.

⁶⁰ *Id.* at 1198.

rather than the expressive creativity of the code,⁶¹ the value that Google's reimplementation created in offering a novel platform for the creation of new software,⁶² and the public benefits of innovation and competition resulting from reimplementation.⁶³

Although the Court's holding resolved the case in favor of Google, there are still open questions about reimplementation. Since the Court relied on fair use to resolve the case,⁶⁴ a future litigant could assert copyright infringement against a reimplementer and argue that *Google* is distinguishable on its facts, a possibility made likely by the "notoriously fact sensitive" nature of the fair use inquiry.⁶⁵ And the question of copyrightability of interfaces, which the Court declined to resolve,⁶⁶ will likely not converge on an answer any time soon, particularly given that the appellate court most likely to decide the issue is one that binds no regional circuit court and yet one that, as a practical matter, is likely to receive every interface copyright case in view of forum shopping strategies.⁶⁷ While the Supreme Court's decision cleared much of the air over reimplementation and copyright, the cloud of concern cannot be said to have been fully lifted yet.

D. *Other Barriers to Reimplementation*

Purported copyright protection of interfaces is not the only barrier to reimplementation. Other intellectual property rights, most notably patents, can prevent competitors from reimplementing interfaces necessary for compatibility with third-party products.⁶⁸ There are numerous patents on multimedia storage formats, for example, which might prevent competing music players from opening Apple audio files.⁶⁹

Firms may also use contractual terms or digital rights management technologies to prevent competitors from reimplementation.⁷⁰ Indeed,

⁶¹ *See id.* at 1201–02, 1208.

⁶² *See id.* at 1203–04.

⁶³ *See id.* at 1206.

⁶⁴ *See id.* at 1197.

⁶⁵ *Georgia v. Pub.Res.Org, Inc.*, 140 S. Ct. 1498, 1513 (2020); *see Harper & Row, Publishers, Inc. v. Nation Enters.*, 471 U.S. 539, 588 (1985) (Brennan, J., dissenting).

⁶⁶ *See Google*, 141 S. Ct. at 1197.

⁶⁷ *See Menell*, *supra* note 36, at 1595.

⁶⁸ *See Pamela Samuelson, Are Patents on Interfaces Impeding Interoperability?*, 93 MINN. L. REV. 1943, 1965–69 (2009) (citing examples of patents on interfaces); Jorge L. Contreras, *A Tale of Two Layers: Patents, Standardization, and the Internet*, 93 DENV. L. REV. 855, 860 (2016).

⁶⁹ *See Dolby Labs., Inc.*, Quarterly Report (Form 10-Q), at 36 (Jan. 28, 2021) (noting ownership of patent licensing pools "for audio coding, interactive television, digital radio, and wireless technologies").

⁷⁰ *See J.H. Reichman & Jonathan A. Franklin, Privately Legislated Intellectual Property Rights: Reconciling Freedom of Contract with Public Good Uses of Information*, 147 U. PA. L.

companies often assert the Computer Fraud and Abuse Act (CFAA)⁷¹ to undermine competitors' ability to retrieve information otherwise available online.⁷² One can imagine using the CFAA against reimplementers.⁷³

Between trailing uncertainty in the wake of *Google* and non-copyright legal regimes, there are plenty of barriers that a firm could put up to prevent reimplementation. To the extent that reimplementation is virtuous in terms of policy, then, legislators have work to do even after the Supreme Court's decision. But is reimplementation good public policy? It is to that question that this Article now turns.

III. INTERCONNECTION REQUIRES REIMPLEMENTATION

If interconnection is desirable policy, as many legislators and experts believe,⁷⁴ then removing barriers to reimplementation must also be on the legislative agenda. That is because, despite their facial differences, interconnection and reimplementation are perhaps as the Dread Pirate Roberts was to the farmhand Westley: two components of a unified interoperability whole, such that the former entails the latter.⁷⁵

Initially, it may seem that interconnection does not require reimplementation. A major social media company could interconnect with all of its smaller competitors without the means of connection being standardized; Facebook could have one set of commands for working with LinkedIn, another set for Twitter, another for TikTok, and so on. Yet while fragmented interconnection is theoretically possible, the need for reimplementation grows out of the overall motivation for interconnection: to increase competition and reduce the influence of

REV. 875, 899–903 (1999) (describing use of contracts as effective intellectual property protections); AARON PERZANOWSKI & JASON SCHULTZ, *THE END OF OWNERSHIP: PERSONAL PROPERTY IN THE DIGITAL ECONOMY* 4 (2016) (“[A]ggressive intellectual property laws, restrictive contractual provisions, and technological locks have weakened end user control over the digital goods we acquire.”).

⁷¹ See 18 U.S.C. § 1030.

⁷² See Kadri, *supra* note 10, at 971–74; Jamie L. Williams, *Automation Is Not “Hacking”*: Why Courts Must Reject Attempts to Use the CFAA as an Anti-Competitive Sword, 24 B.U. J. SCI. & TECH. L. 416, 446–49 (2018); Charles Duan, *Hacking Antitrust: Competition Policy and the Computer Fraud and Abuse Act*, 19 COLO. TECH. L.J. 313, 320–31 (2021).

⁷³ See Duan, *supra* note 72, at 321–22; Breana Love, Comment, *The Chaos of the CFAA: Facebook’s Successful CFAA Claim Affects Website Owners, Competitors, and You*, 50 LOY. L.A. L. REV. 831, 845 (2017) (describing competition concerns resulting from interpretation of the CFAA in *Facebook, Inc. v. Power Ventures, Inc.*, 844 F.3d 1058 (9th Cir. 2016)).

⁷⁴ See *supra* Section I.B.

⁷⁵ It is trivial to show that reimplementation requires interconnection. The purpose of reimplementing a system is to enable third parties to transmit identical commands to the new system. See *supra* text accompanying note 35. Transmitting those commands requires a mode of communication and thus interconnection. See *supra* text accompanying note 17.

dominant firms in information technology markets.⁷⁶ To see why interconnection policy can achieve robust competition only in tandem with freedom to reimplement, I begin by outlining a framework of interconnection, and then consider how competition policy works within that framework.

A. *Horizontal and Vertical Interconnection*

Drawing from antitrust law,⁷⁷ interconnection between any two services may be described as “horizontal” or “vertical.” In a horizontal relationship, the connected services are market substitutes that serve similar consumers.⁷⁸ The purpose of interconnection is to enable one service’s consumers to access the other service’s resources—enabling users of Facebook to direct-message LinkedIn users, for example.

By contrast, a vertical relationship is present between systems and upstream or downstream users: mobile phone operating systems and the apps that run on them, for example, or a social media platform and its users who produce posts and other content.⁷⁹ As with the antitrust notion of verticality, the term refers to relationships between producers and consumers.⁸⁰ But the unusual bidirectional nature of information technology makes it sometimes unclear who is which: users both produce content on Facebook and consume it from the platform, for example.⁸¹

B. *Reimplementation and Vertical Interconnection*

To see where reimplementation fits in, consider first vertical interconnection, say between a social media platform and the apps atop

⁷⁶ See, e.g., HOUSE JUDICIARY REPORT, *supra* note 7, at 385; STIGLER CTR. FOR THE STUDY OF THE ECON. & THE STATE, *supra* note 23, at 16; CRÉMER ET AL., *supra* note 27, at 71. Interoperability can also have other benefits, such as enhancing free speech and media diversity, but these benefits generally derive from increased competition. See BROWN, *supra* note 6, at 27–46; MIKE MASNICK, PROTOCOLS, NOT PLATFORMS: A TECHNOLOGICAL APPROACH TO FREE SPEECH 14–26 (Knight First Amendment Inst. at Columbia Univ. 2019).

⁷⁷ See, e.g., HANNO F. KAISER, A PRIMER IN ANTITRUST LAW AND POLICY 20, 22 (2009), <https://www.law.berkeley.edu/php-programs/courses/fileDL.php?fid=381> [<https://perma.cc/Q2E5-E588>].

⁷⁸ See Kerber & Schweitzer, *supra* note 2, at 51.

⁷⁹ See *id.* at 52.

⁸⁰ See KAISER, *supra* note 77, at 20, 22.

⁸¹ See generally Michael Katz & Jonathan Sallet, *Multisided Platforms and Antitrust Enforcement*, 127 YALE L.J. 2142, 2143, 2153–58 (2018) (discussing complexities of two-sided markets present for many digital platforms).

it. Many proponents of interoperability policy favor opening up vertical interconnection as a first step.⁸²

But without a right of reimplementation, vertical interconnection could actually enhance the platform's dominance. In order to grow, a startup social media platform would need to attract apps on the dominant platform to switch over.⁸³ If the startup uses an incompatible app interface, then the costs of rewriting apps for the startup platform would likely dissuade switching and stunt the new platform's growth.⁸⁴ Reimplementation of the app interface thus takes on outsized importance to the competition that vertical interoperability enables.

C. *Reimplementation and Horizontal Interconnection*

This value of reimplementation for switching vertical relationships over to competitors is reason enough to facilitate reimplementation as a policy matter. But the switching cost problem also shows the need for reimplementation in purely horizontal contexts.

A startup competitor to a dominant platform would want not only to interconnect with the dominant platform but also with other intermediately successful competitors.⁸⁵ A newly launched social media messaging service, for example, would need to exchange messages not only with Facebook but also with LinkedIn, Twitter, TikTok, and others. If the command names that LinkedIn uses to interoperate with Facebook were copyright-protected, however, someone (either LinkedIn or the new

⁸² See, e.g., CRÉMER ET AL., *supra* note 27, at 60 (favoring “protocol” and “data” interoperability over “full protocol interoperability”).

⁸³ See CARL SHAPIRO & HAL R. VARIAN, INFORMATION RULES: A STRATEGIC GUIDE TO THE NETWORK ECONOMY 191–92 (1999) (“[C]ompatibility with the installed base of equipment is often critical to the launch of a new generation of technology.”); cf. Audrey Watters, *Cloud Community Debates, Is Amazon S3’s API the Standard? (And Should It Be?)*, READWRITE (July 12, 2010), <https://readwrite.com/2010/07/12/cloud-community-debates-is-ama> [<https://perma.cc/UUL2-YKCP>] (noting multiple competitors’ reimplementations of Amazon’s AWS cloud computing interface).

⁸⁴ Cf. Amit Tiwari, *How Much Does It Cost to Convert an iOS App to Android*, BUS. 2 CMTY. (Nov. 30, 2020), <https://www.business2community.com/mobile-apps/how-much-does-it-cost-to-convert-an-ios-app-to-android-02366029> [<https://perma.cc/FHV3-29VL>] (estimating costs of porting an app from iOS to Android at between \$10,000 and \$80,000); Jigar Mistry, *How to Convert iOS App to Android App (Cost + Challenges)*, SPACEO TECHS. (May 21, 2021), <https://www.spaceotechnologies.com/convert-ios-app-to-android-app> [<https://perma.cc/XY6P-VLWC>] (\$6,000 to \$20,000); DJ Wardynski, *How Much Does It Cost to Convert an iOS App to Android?*, BRAINSPIRE (Sept. 7, 2017), <https://www.brainspire.com/blog/how-much-does-it-cost-to-convert-an-ios-app-to-android> [<https://perma.cc/PS25-YAQA>] (describing challenges of converting apps from one platform to another).

⁸⁵ See Kades & Scott Morton, *supra* note 9, at 24 (describing an interoperability regime where “entering platforms would each have a bridge to Facebook.com, but not to each other” as “a dysfunctional market”).

service) would need to devise new commands for message exchange between the new system and LinkedIn. Multiplied over all other systems, the costs of development for new entrants to a “fragmented” ecosystem of incompatible interfaces would likely also defeat competition.⁸⁶

Accordingly, insofar as the goal of interconnection policy is robust competition, reimplementation must be a part of that policy. Without it, competition on vertical market features such as app stores would be hindered by switching costs and lock-in effects, and horizontal competition would be limited to an oligopoly of a few large firms.

IV. IMPLEMENTING REIMPLEMENTATION

To obtain the sorts of competitive digital markets that interoperability-bent policymakers desire, policymakers must consider how to facilitate reimplementation. This Section considers several case studies and options for doing so.

A. Case Studies

1. Power Frequencies

Historically, interoperability efforts have involved both reimplementation and interconnection. One early example involved the changing of the power grid in Southern California in 1948.⁸⁷ Prior to then, most of the country’s power plants output alternating current at a frequency of 60 Hz, but the Mill Creek plant serving Southern California operated at 50 Hz, and power plants built in the area thereafter used the same unusual frequency.⁸⁸ Appliances such as electric clocks occasionally relied on the electrical frequency and so had to be built differently for California than the rest of the country; a New York clock brought to Los Angeles would literally slow down.⁸⁹

When the region finally decided to modernize so that it could receive electricity from the newly built Hoover Dam, it was changing its interconnection expectations—the wires would now transmit at 60 Hz rather than 50—and so it had to deal with a reimplementation problem as

⁸⁶ See SHAPIRO & VARIAN, *supra* note 83, at 256.

⁸⁷ See generally H.W. Tice et al., *A System Frequency Change*, 67 ELEC. ENG’G 866 (1948); Nathan Masters, *Before 1948, LA’s Power Grid Was Incompatible with the Rest of the US*, GIZMODO (Feb. 4, 2015, 2:00 PM), <https://gizmodo.com/before-1948-las-power-grid-was-incompatible-with-the-r-1683629042> [<https://perma.cc/5686-TLN7>].

⁸⁸ See Tice et al., *supra* note 87, at 866.

⁸⁹ See Masters, *supra* note 87.

well, in the form of updated appliances.⁹⁰ Southern California Edison exchanged hundreds of thousands of clocks, lights, and refrigerators to ensure that every appliance in service used the standard 60 Hz frequency—essentially ensuring that California appliances were reimplementations of those on other electric grids.⁹¹

2. Digital Television

While intellectual property was not of concern in the electric frequency switchover—a single frequency cannot be copyrighted—it would figure prominently in other government interoperability efforts. Around the turn of the twenty-first century, the United States embarked on a massive conversion of the broadcast television system from analog to digital signals, a process called the “DTV transition.”⁹² As part of that transition, the Federal Communications Commission (FCC) issued regulations mandating that television manufacturers and broadcasters comply with a collection of technical standards promulgated by the Advanced Television Systems Committee (ATSC) for digitizing broadcast signals.⁹³ The DTV transition thus illustrated the close tie between interconnection and reimplementation: at the same time that the FCC was instructing broadcasters and device manufacturers on how to interconnect with each other, it was also requiring those firms to reimplement the commands and signals promulgated in the ATSC standards.⁹⁴

If ATSC had been able to wield unfettered intellectual property rights over its standards, then the FCC action would have rendered the entire television ecosystem beholden to that one industry consortium.⁹⁵ Keenly interested in avoiding the monopolization of the television industry, the FCC indicated its intention to scrutinize ATSC’s intellectual

⁹⁰ See Tice et al., *supra* note 87, at 866–67.

⁹¹ See *id.* at 877–80; Masters, *supra* note 87.

⁹² See Jeffrey A. Hart, *The Transition to Digital Television in the United States: The Endgame*, 1 INT’L J. DIGIT. TELEVISION 7, 7–8 (2010), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2690003 [<https://perma.cc/9GJV-LJQ4>].

⁹³ See 47 C.F.R. § 73.682(d) (2021); Advanced Television Sys. & Their Impact Upon the Existing Television Broad. Serv., 11 FCC Rcd. 17771, 17787 (1996) (fourth report and order), *amended by* 12 FCC Rcd. 3388 (1997).

⁹⁴ Notably, the FCC did not fully specify the standards for interconnection between broadcasters and devices, which “guaranteed that there would be confusion in the marketplace of DTV equipment and services.” Hart, *supra* note 92, at 19.

⁹⁵ See *generally* Microsoft Corp. v. Motorola, Inc., 795 F.3d 1024, 1030–31 (9th Cir. 2015); Timothy S. Simcoe, *Private and Public Approaches to Patent Hold-up in Industry Standard Setting*, 57 ANTITRUST BULL. 59, 61 (2012).

property practices.⁹⁶ The agency observed ATSC members' promises to license patent rights to its standards on fair, reasonable, and non-discriminatory terms, and reserved power to intervene if ATSC or its members failed to abide by those promises.⁹⁷ This concern carries over to the present day: as the FCC considers upgrading its regulations to the newer ATSC 3.0 standards, it continues to rely on promises of fair patent licensing and has noted its willingness to step in otherwise.⁹⁸

3. Electronic Health Records

Probably the most comprehensive recent interoperability effort explicitly recognized and dealt with reimplementation. Electronic health records (EHR) have tantalizingly promised the possibility of a revolutionized health care system, but adoption of that technology has been stymied because EHR system vendors have not made their systems interoperable, instead using technical and legal means to prevent patients and hospitals from bringing records to or viewing them on competitors' systems.⁹⁹ In the 21st Century Cures Act,¹⁰⁰ Congress directed the Department of Health and Human Services to prohibit these practices of "information blocking" through regulations,¹⁰¹ and also to establish national standards for EHR interchange.¹⁰²

The wide-ranging "interoperability" rules, finalized last year, address both interconnection and reimplementation in detail.¹⁰³ The section addressing information blocking strictly limits the permissible reasons for which an EHR vendor may restrict the flow of information to a competing system or to a third-party application, thereby limiting

⁹⁶ See *Advanced Television Sys. & Their Impact Upon the Existing Television Broad. Serv.*, 11 FCC Rcd. at 17794.

⁹⁷ See *id.*

⁹⁸ See *Authorizing Permissive Use of the "Next Generation" Broad. Television Standard*, 32 FCC Rcd. 9930, 9981 n.300 (2017) (report and order and further notice of proposed rulemaking).

⁹⁹ See generally Michelle M. Mello, Julia Adler-Milstein, Karen L. Ding & Lucia Savage, *Legal Barriers to the Growth of Health Information Exchange—Boulders or Pebbles?*, 96 MILBANK Q. 110, 130–32 (2018); OFF. OF THE NAT'L COORDINATOR FOR HEALTH INFO. TECH., *REPORT ON HEALTH INFORMATION BLOCKING 15–19* (2015), https://www.healthit.gov/sites/default/files/reports/info_blocking_040915.pdf [<https://perma.cc/Y3LQ-8R6U>].

¹⁰⁰ See 21st Century Cures Act (Cures Act), Pub. L. No. 114-255, 130 Stat. 1033 (2016) (codified at 42 U.S.C. §§ 300jj–300jj-52).

¹⁰¹ See § 300jj-52(b)(1) (granting the Inspector General of HHS authority to investigate and penalize instances of information blocking).

¹⁰² See § 300jj-11(c)(1)(A) (granting the Office of the National Coordinator for Health Information Technology the power to endorse standards for health information exchange).

¹⁰³ 21st Century Cures Act: Interoperability, Information Blocking, and the ONC Health IT Certification Program, 85 Fed. Reg. 25642 (May 1, 2020) (codified at 45 C.F.R. pt. 170, 171).

barriers to interconnection among those systems and applications.¹⁰⁴ Further recognizing that interoperability may require competitors or third-party applications to engage in reimplementation, the information blocking rule constructs a detailed intellectual property licensing procedure,¹⁰⁵ including requirements that royalty rates be fair, reasonable, and non-discriminatory.¹⁰⁶

As these examples show, policymakers looking to introduce interoperability into technology markets have addressed not only interconnection but also reimplementation to ensure success in achieving their objectives of greater competition and consumer choice. Lawmakers hoping to achieve those goals today should similarly consider a dual-pronged approach of promoting both interconnection and reimplementation.

B. *Legislative Options*

Lawmakers have a variety of options for enabling reimplementation in social media and Internet platform markets. This Section considers three such options: mandatory compliance with particular communication standards, conditions upon a class of dominant firms, and general abrogation of legal barriers to replication.

To aid in this discussion, consider an example policy of enabling person-to-person messaging among multiple platforms—a Facebook message, say, being deliverable to a LinkedIn user and vice versa. Obviously other policies for opening up social media and Internet markets will face different considerations, but this example is effective in showing both faces of interoperability: the different messaging platforms obviously must interconnect with each other, and they ought to reimplement interfaces to ensure interchangeability and thus robust competition.

1. Government-Adopted Standards

The case studies show that standardization is often a way of mandating interconnection and enabling reimplementation in tandem. Thus, to guarantee a right to reimplement, the government could devise technical standards of commands and syntaxes and then require or otherwise encourage firms to comply with those standards. For example, a federal agency could draw up protocols for message exchange and

¹⁰⁴ See 45 C.F.R. § 171.103(a)(1) (2021).

¹⁰⁵ See 45 C.F.R. § 171.303(a) (2021).

¹⁰⁶ See 45 C.F.R. § 171.303(b).

require that social media firms accept communications in compliance with those protocols. Since the government cannot hold copyrights in its own works and could otherwise abstain from asserting rights in the standards,¹⁰⁷ firms would face potentially no barriers to reimplementing them.

A serious concern with government-developed standards, however, is that federal regulators do not necessarily have the technical expertise or industry experience to know how to craft them effectively.¹⁰⁸ As a result, such standards are largely prohibited under current executive policy.¹⁰⁹

A better option, widely used in government today, would be to delegate the actual construction of the standard to a private industry consortium.¹¹⁰ Both the EHR interoperability regulations and the ATSC standards adopted during the DTV transition fit this pattern.¹¹¹ In this case, though, privately held copyrights and other intellectual property interests could hold up reimplementation.¹¹² Contractual arrangements by the standard-setting industry consortia, often called “FRAND obligations,” could alleviate these barriers to reimplementation.¹¹³ However, existing FRAND obligations often fail to address copyrights,¹¹⁴ and in any event the scope and effect of these contracts is heavily disputed and uncertain.¹¹⁵ Furthermore, even industry-devised standards may lock in present technologies and limit future innovation,¹¹⁶

¹⁰⁷ See 17 U.S.C. § 105(a).

¹⁰⁸ See OFF. OF MGMT. & BUDGET, EXEC. OFF. OF THE PRESIDENT, FINAL REVISION OF OMB CIRCULAR A-119, FEDERAL PARTICIPATION IN THE DEVELOPMENT AND USE OF VOLUNTARY CONSENSUS STANDARDS AND IN CONFORMITY ASSESSMENT ACTIVITIES 1 (2016) [hereinafter OMB CIRCULAR A-119 (2016)], https://www.whitehouse.gov/wp-content/uploads/2020/07/revised_circular_a-119_as_of_1_22.pdf [<https://perma.cc/S3JU-3AGD>] (executive policy against government-authored standards is “intended to encourage Federal agencies to benefit from the expertise of the private sector”); see also *id.* at 14 (noting interest in eliminating government costs of developing standards and providing incentives for private industry to develop standards).

¹⁰⁹ See *id.* at 17 (prohibiting “government-unique standards . . . except where inconsistent with law or otherwise impractical”).

¹¹⁰ See, e.g., Kades & Scott Morton, *supra* note 9, at 23.

¹¹¹ See, e.g., 45 C.F.R. § 170.215 (2021) (adopting external standards for health care interoperability); 47 C.F.R. § 73.682(d) (2021) (adopting ATSC standards for digital television).

¹¹² See Carl Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting*, 1 INNOVATION POL’Y & ECONOMY 119, 136 (2001).

¹¹³ See *id.* at 128; Anne Layne-Farrar, A. Jorge Padilla & Richard Schmalensee, *Pricing Patents for Licensing in Standard-Setting Organizations: Making Sense of FRAND Commitments*, 74 ANTITRUST L.J. 671, 672 (2007). FRAND stands for “fair, reasonable, and non-discriminatory”; the term RAND (dropping “fair”) is considered equivalent. See *id.* at 671–72.

¹¹⁴ See Duan, *supra* note 10, at 31.

¹¹⁵ See, e.g., Herbert Hovenkamp, *FRAND and Antitrust*, 105 CORNELL L. REV. 1683, 1693–94 (2020) (noting multiple disputes over interpretation of FRAND obligations).

¹¹⁶ See, e.g., CRÉMER ET AL., *supra* note 27, at 59. But see Kades & Scott Morton, *supra* note 9, at 24–25 (contending that innovation ancillary to the standard will outweigh such lock-in).

and they may favor large, dominant firms that can heavily influence standard-setting consortia.¹¹⁷ Mandatory interoperability standards, whether authored by the government or private industry, are at best a limited strategy for bolstering competition.

2. Conditions upon Regulated Firms

Rather than enabling reimplementations of particular interoperability standards, it may be better to enable reimplementations of any interface that a dominant firm adopts to serve a certain market. For example, Facebook might be required to provide a public set of commands for messaging and allow any competitor to access it without charge. This approach has been used in the past, as a condition of the merger between America Online and Time Warner for example,¹¹⁸ and it is currently being proposed in Congress.¹¹⁹ Under such an approach, the dominant firm would be required to waive or cheaply license any intellectual property rights needed to replicate the necessary interoperability commands or protocols, and otherwise not inhibit reimplementations.¹²⁰

By contrast to technical standards adoption, a requirement that a dominant firm permit reimplementations does not lock industry into a particular technology, enabling further innovation. But applying policy only to firms after they achieve market dominance essentially fixes that policy one step behind the ball. While interoperability can encourage competition against a monopoly player, other network effects and switching costs may nevertheless still give the dominant firm an edge and keep competitors at bay.¹²¹ Better would be policy that encourages interoperability before dominant players arise, thereby achieving the

¹¹⁷ In *Allied Tube & Conduit Corp. v. Indian Head, Inc.*, for example, steel industry representatives colluded to exclude plastic tubing from a technical standard on electrical conduit, thereby leveraging the standard to exclude competitors. *See* 486 U.S. 492, 495–96 (1988).

¹¹⁸ *See* Applications for Consent to the Transfer of Control of Licenses & Section 214 Authorizations by Time Warner Inc. & Am. Online, Inc., Transferors, to AOL Time Warner Inc., Transferee, 16 FCC Rcd. 6547, 6627–28 (2001); Matthew A. Goldberg, Comment, *Message in a Bottleneck: The Need for FCC-Mandated Interoperability Among Instant Messaging Providers*, 9 MARQ. INTELL. PROP. L. REV. 133, 140 (2005).

¹¹⁹ *See* Augmenting Compatibility and Competition by Enabling Service Switching Act of 2019 (ACCESS Act), S. 2658, 116th Cong. § 4(a) (as introduced in Senate, Oct. 22, 2019); Mike Masnick, *The Good and the Bad of the ACCESS Act to Force Open APIs on Big Social Media*, TECHDIRT (Oct. 23, 2019), <https://www.techdirt.com/articles/20191022/18012743247/good-bad-access-act-to-force-open-apis-big-social-media.shtml> [<https://perma.cc/VJ47-QZFP>].

¹²⁰ *See, e.g.*, S. 2658, §§ 4(c)(2)(B), 4(c)(4) (requiring fees and usage limits on interoperability interfaces to be reasonable and nondiscriminatory, and requiring interface specifications to be public).

¹²¹ *See generally* SHAPIRO & VARIAN, *supra* note 83, at 103–04 (describing lock-in effects with technology).

benefits of competitive markets from the start and avoiding the need for remedial, likely imperfect, action after the fact.

3. Legislating on Software Copyrights

Prospective achievement of interoperability and competition might best be achieved by removing barriers to reimplementation entirely. Congress could expand upon the *Google* decision by answering the undecided question of copyrightability of interfaces, thereby ensuring that reimplementation is not hindered by copyright law.¹²² It could further review other laws such as the CFAA that can inhibit reimplementation.¹²³

Obviously, these measures would enable reimplementation to the greatest extent. The question is whether they would go too far, perhaps coming at the expense of other policy interests. In particular, one might worry that diminishing exclusive intellectual property rights would diminish incentives to create new interfaces, since competitors can “freeload off of” them.¹²⁴

This concern is minimized by several considerations. For one thing, incentives to create interfaces would seem unnecessary—a programmer writing software must produce an interface for it if that software is to be used at all.¹²⁵ It is also not clear that reimplementation of interfaces always harms the creator’s market; many software firms in fact seek to have their interfaces incorporated into open standards to expand their markets and attract consumers.¹²⁶ And any concern about diminished incentives must be offset by the downstream benefits of compatibility and innovation that arise from reimplementation.¹²⁷

More importantly, a page of history is worth a volume of intellectual property theory. Despite legal uncertainty about the copyrightability of computer software interfaces, the information technology industry has proceeded on the assumption that reimplementation was legally

¹²² See HICKEY, *supra* note 14, at 4.

¹²³ See *supra* notes 71–73 and accompanying text.

¹²⁴ *With High Court Mum on Java Copyrights, Is Innovation Safe?*, LAW360 (July 1, 2015) (quoting Krish Gupta, EMC Corp.), <https://www.law360.com/articles/674082/with-high-court-mum-on-java-copyrights-is-innovation-safe> [<https://perma.cc/MZ29-M9JB>]; see also *Google LLC v. Oracle Am., Inc.*, 141 S. Ct. 1183, 1217 (2021) (Thomas, J., dissenting); Evan Weidner, Comment, *A Little Overlap Never Hurt Anyone: Overlapping IP Rights and Oracle Am., Inc. v. Google LLC*, 4 BUS. ENTREPRENEURSHIP & TAX L. REV. 212, 226 (2020).

¹²⁵ See Fred von Lohmann, *The New Wave: Copyright and Software Interfaces in the Wake of Oracle v. Google*, 31 HARV. J.L. & TECH. 517, 529 (2018) (“After all, the incentive to create a method of operating something is inherent in the incentive to create the thing itself.”).

¹²⁶ See SHAPIRO & VARIAN, *supra* note 83, at 229–31.

¹²⁷ See *Google*, 141 S. Ct. at 1203–04 (majority opinion).

permissible since the dawn of that industry.¹²⁸ Even Oracle's flagship database product reimplemented the commands and syntaxes of IBM's SQL interface,¹²⁹ and evidence from public licensing policies shows that top industry professionals and the federal government have long believed that patents were the only intellectual property relevant to reimplementation of technical standards.¹³⁰

And yet there has been no shortage of production of interoperability interfaces. "Open Internet standards" by the thousands can be "implemented around the world in all kinds of Internet products and services," which the Internet Society describes as "the cornerstone of the Internet's success."¹³¹ The success of the Internet, built on unhindered reimplementation of millions of lines of software interfaces made freely available, rebuffs the notion that such interfaces will not be produced absent intellectual property rights.

In sum, an expansion of *Google* to further remove barriers to reimplementation would likely not affect the production of interfaces, and it will most effectively allow Internet platform competitors to rise without locking in existing technologies in the ways that predefined standards might do. In tandem with interconnection, broad rights to reimplement could create the highly interoperable, competitive digital landscape that many lawmakers and policy experts would like to achieve.

CONCLUSION

Defining interoperability is no simple task: an extensive study of the subject finds "no one-size-fits-all definition" and exhorts the reader to "explore a broader understanding" of interoperability "in different

¹²⁸ See Duan, *supra* note 10, at 3–4.

¹²⁹ See Lee, *supra* note 48; DIG. SYS. RSCH. CTR., THE 1995 SQL REUNION: PEOPLE, PROJECTS, AND POLITICS 15 (Paul McJones ed., 1997), https://www.mcjones.org/System_R/SQL_Reunion_95/SRC-1997-018.pdf [<https://perma.cc/6A9L-7FV5>] (Oracle founder Larry Ellison "wanted to make sure that his product was fully compatible with [IBM's SQL language], right down to the error code values" (quoting Don Chamberlin, a principal designer of the SQL interface language at IBM)).

¹³⁰ See BEKKERS & UPDEGROVE, *supra* note 10, at 36 ("As a generality, the issue of what might be referred to as 'essential copyrights' is rarely dealt in an effective way in IPR policies."); Duan, *supra* note 10, at 31–35; Brief of the R Street Inst. et al. as Amici Curiae in Support of Petitioner, *supra* note 35, at 25–27 (identifying assumption that interfaces are not subject to copyright protection in OMB CIRCULAR A-119 (2016), *supra* note 108).

¹³¹ INTERNET SOC'Y, OPEN INTERNET STANDARDS: AN INTERNET SOCIETY PUBLIC POLICY BRIEFING 1 (2015), <https://www.internetsociety.org/wp-content/uploads/2017/09/ISOC-PolicyBrief-OpenStandards-20151030-nb.pdf> [<https://perma.cc/JJ44-JF35>]; see Dan York, *Celebrating 50 Years of the RFCs That Define How the Internet Works*, INTERNET SOC'Y (Apr. 7, 2019), <https://www.internetsociety.org/blog/2019/04/celebrating-50-years-of-the-rfcs-that-define-how-the-internet-works> [<https://perma.cc/WL6T-KK8P>] (noting "over 8,500" Internet standards documents from one standard-setting organization).

contexts and at different levels.”¹³² Toward this broader understanding, this Article contributes a characterization of the relationship between interconnection and reimplementation, two elements of interoperability that at once seem entirely different and yet are closely linked.

As policymakers look to interoperability as a tool for enhancing competition, innovation, and consumer choice, they will need to ensure that pro-interoperability policies address reimplementation. History shows that both can be addressed,¹³³ and this Article has presented several options for ensuring that reimplementation is enabled in tandem with interconnection. In particular, legislation addressing interface copyrights may have a profound effect on overcoming market concentration in the technology industry.¹³⁴ The confluence between interest in social media interoperability and the *Google* decision could thus produce, in the words of one impressive clergyman, a legislative “mawidge” that “is what bwings us togevver today.”¹³⁵

¹³² PALFREY & GASSER, *supra* note 2, at 5.

¹³³ *See supra* Section IV.A.

¹³⁴ *See supra* Section IV.B.

¹³⁵ THE PRINCESS BRIDE, *supra* note 1, at 1:18:17–:43.