

HOT APPS: RECALIBRATING IP TO ADDRESS ONLINE SOFTWARE

DAVID STEIN*

Intellectual property (IP) and consumer software have fallen out of sync. Software IP rules developed during an era of installable software, which has high upfront costs and is easy to copy. IP rights helped companies recoup their upfront costs by granting them the exclusive right to make and sell copies. Limits on IP protection for software were designed to foster competition by letting market entrants copy the interfaces of incumbent products. Online, the economics of the software industry are inverted. Online software has low upfront costs and is not susceptible to copying, rendering existing IP protections unnecessary. Meanwhile, limitations designed to promote competition now allow incumbents to raise barriers to entry by copying from newcomers. In sum, today's IP regime exacerbates concentration and depresses innovation in markets for online consumer services.

Given the growing role online services play in data collection, commerce, and communication, these broken incentives have far-reaching effects. Fixing these incentives is urgent. Policymakers and commentators blame online concentration on structural market failures and turn to antitrust remedies for solutions. But this pervasive narrative focuses on a symptom, not the cause. This Article argues that tech concentration is an artifact of IP law's failure to keep up with technology.

This Article proposes a program for IP reform: replace the trade-motivated aspects of software IP law with expanded trade regulation. Drawing on common law misappropriation as a model, it sketches one politically pragmatic implementation approach.

Beyond this Article's focus on software innovation, it serves as a case study describing the mechanics behind a law falling out of sync with technology. As such, it may help policymakers avoid similar legislative and regulatory pitfalls as they regulate emerging and fast-changing technologies.

* Frank Guarini Scholar of Global Law & Tech, Information Law Institute Postdoctoral Fellow, and Adjunct Professor of Law, NYU Law. I owe thanks for helpful suggestions and discussion to Katherine Jo Strandburg, Florencia Marotta-Wurgler, Stefan Bechtold, James Grimmelman, Adam Littlestone-Luria, Aniket Kesari, C. Scott Hemphill, Christopher Sprigman, Thomas Streinz, Elettra Bietti, Camilla Hrdy, Daniel Francis, Ira Rubinstein, Jason Schultz, Rochelle Dreyfuss, Katrina Geddes, Michel Gal, Richard Brooks, Sebastian Benethol, Alexandre de Streel, Stav Zeitouni, Sepehr Shahshahani, Neil Richards, Jessica Silby, Jens Frankenreiter, Jeannie Fromer, and Rory Van Loo. I also received helpful feedback from members of the Information Law Institute, Privacy Research Group, Lederman Fellowship, and Center for Cybersecurity at NYU; from participants at the NYU ACP Paper Workshop, IP Scholars Conference, BU IP Workshop, the CS+Law Research Workshop; and from the *Wisconsin Law Review* editorial staff. All errors are my own.

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INTRODUCTION

In 2013, a thirteen-person tech startup named Orchestra launched an email app called Mailbox.¹ It had several novel features, including a swipe-based interface and the ability to “snooze” emails for later.² These features fixed problems that had plagued smartphone email apps for the past six years.³ Mailbox was an instant hit and Orchestra could not build or buy enough capacity to keep up with demand, so it set up a waiting list.⁴ Orchestra scrambled to take on new users, pushing their systems to the limit and triggering occasional outages.⁵ But the waiting list just grew faster. Five weeks after the launch, Dropbox acquired the startup for a reported \$100 million and dedicated its substantial infrastructure and engineering capacity to Mailbox’s scaling challenge.⁶ Incumbents in the email space were paying attention. By the time the million-person Mailbox waiting list cleared, Apple had already incorporated Mailbox’s novel features into the iPhone, Microsoft Outlook quickly followed suit, and Google released a Mailbox clone (Google Inbox) to hundreds of millions of Gmail users.⁷ As one commentator observed: “Mailbox’s central competitive advantage—its clever interaction design—was no longer so unique.”⁸ Despite Orchestra and Dropbox’s best efforts,

1. Seth Fiegerman, *Mailbox Email App Finally Released on iPhone (Sort of)*, MASHABLE (Feb. 7, 2013), <https://mashable.com/archive/mailbox-iphone-release> [<https://perma.cc/J69K-QYFE>]; Darrell Etherington, *Dropbox Buys Mailbox, All 13 Employees Joining and App Will Remain Separate*, TECHCRUNCH (Mar. 15, 2013, 12:05 PM), <https://techcrunch.com/2013/03/15/dropbox-buys-mailbox-all-13-employees-joining-and-app-will-remain-separate/> [<https://perma.cc/F6HF-PHW3>].

2. *Fly Through Your Email*, MAILBOX [<https://web.archive.org/web/20140831100349/http://www.mailboxapp.com/>].

3. See, e.g., Ellis Hamburger, *Inbox Unchained: Mailbox Just Fixed Email on the iPhone*, VERGE (Feb. 13, 2013, 12:59 PM), <https://www.theverge.com/2013/2/7/3961544/mailbox-app-for-iphone-inbox-unchained> [<https://perma.cc/MU59-TQYK>]; *Fly Through Your Email*, *supra* note 2.

4. *How We’re Rolling out Mailbox*, MAILBOX (Jan. 22, 2013) [<https://web.archive.org/web/20130217074540/http://mailboxapp.tumblr.com/>].

5. See Sean Ludwig, *Mailbox CEO Says Insane 380K Person Wait List Kept App from Crashing Today*, VENTUREBEAT (Feb. 7, 2013, 4:25 PM), <https://venturebeat.com/business/mailbox-app-iphone-wait-list/>.

6. See Etherington, *supra* note 1; Jessica E. Lessin, *Dropbox Buys Mailbox, an App with Some Buzz*, WALL ST. J. (Mar. 15, 2013, 1:00 PM), <https://www.wsj.com/articles/BL-DGB-26408>; Casey Newton, *Why Mailbox Died*, VERGE (Dec. 8, 2015, 3:05 PM), <https://www.theverge.com/2015/12/8/9873268/why-dropbox-mailbox-shutdown> [<https://perma.cc/7NTG-82CD>].

7. See *infra* Figure 1.

8. Austin Carr, *Should Good Interaction Design Be Legally Defensible?*, FAST CO. (Oct. 14, 2013), <https://www.fastcompany.com/3019905/should-good-interaction-design-be-legally-defensible>.

Mailbox failed to reach the market before it was crowded with clones. A year later, the floundering Mailbox app shut down.⁹

Was Mailbox's failure caused by bad luck and poor execution? This Article argues, instead, that it reveals a pressing failure of law and policy. Intellectual property (IP) laws should support new products, like Mailbox, that make technology more useful. Competition law should preserve companies, like Orchestra or Dropbox, that increase consumer choice by offering alternatives to incumbent offerings. Under the current regime, however, Orchestra could not establish a foothold before being crowded out of the market by incumbents' Mailbox clones, even with support from one of the largest private digital infrastructures in the world.

IP has fallen out of sync with the software industry. This Article argues for closing that gap. Software-specific IP doctrine developed during the era of installable software. Installable software had high upfront costs and was easy to copy and install on multiple machines. IP laws helped firms recoup development costs by giving them the exclusive right to make and sell copies of their programs. Those rights did not extend to software interfaces because new competitors often needed to copy incumbent interfaces to enter the market.¹⁰

In the context of online services, the motivating assumptions underlying software IP fall apart. Implementations do not need IP protection. There is little risk of copying when the implementing code is never distributed, and upfront costs are low because development costs are amortized over the life of the product.¹¹ Allowing copying does not facilitate market entry. Interoperability between online services requires

9. See Brian Barrett, *Mailbox Is Dead. Replace It with One of These Services*, WIRED (Feb. 26, 2016, 9:00 AM), <https://www.wired.com/2016/02/mailbox-app-replacements/>; Mailbox Team, *Saying Goodbye*, MAILBOX BLOG (Dec. 7, 2015) [<https://web.archive.org/web/20160212004556/https://blogs.dropbox.com/mailbox/2015/12/saying-goodbye/>].

10. By analogy: Imagine if houses were built with special screws and tools that are only compatible with each other. To enter the market, a new screwdriver manufacturer would either need to copy the tip of the incumbent screwdriver or swap out all the screws in their customers' homes. See generally *Screw*, U.S. Patent No. 1,908,080 (filed May 20, 1932) (issued May 9, 1933); *Screw Driver*, U.S. Patent No. 1,908,081 (filed June 17, 1932) (issued May 9, 1933); USPTO, COOPERATIVE PATENT CLASSIFICATION 9 (2024), <https://www.uspto.gov/web/patents/classification/cpc/pdf/cpc-scheme-F16B.pdf> [<https://perma.cc/8WXD-CKUE>] (including "[s]crews . . . with specially-shaped heads . . . for rotation by a tool" and references to thousands of other patents). See also *infra* Section II.B (discussing how the web of interdependencies in installable software essentially requires some amount of interface copying).

11. See *infra* Section II.C.

contractual and technical connections between providers.¹² And interfaces need IP protection. As the Mailbox example suggests (and Part III covers in greater detail), interface cloning by incumbents can be ruinous, even for well-resourced entrants.¹³

Software IP's misalignment with online services undermines recent attempts to rein in the concentration of online markets. To decrease market concentration, competition commentators and regulators started challenging the acquisition of supposed "nascent competitive threats."¹⁴ Proponents of this regulatory approach want these budding competitors to grow into major players in relevant markets. This Article argues that—absent substantial IP reform—such growth is exceedingly unlikely in online consumer tech. By removing the prospect of acquisition before bolstering the prospect of growth, competition enforcers risk destroying one of the few surviving incentives for market entry and innovation, leaving fewer competitors and less innovation.

Recalibrating software IP for the online era is not straightforward. Computer programs have always occupied a strange corner of IP doctrine. Most programs are too functional to fit squarely within copyright law's protection of expressive works yet lack sufficient novelty for patent protection.¹⁵ The history of software IP is filled with courts' and policymakers' "attempt[s] to fit the proverbial square peg in a round hole" as they tried to shape copy protections to promote production and competition.¹⁶ But IP law focuses on subject matter, not production incentives or competitive context. In effect, IP rights use subject matter as a proxy for relevant market dynamics. As long as specific kinds of innovation remain linked to the same market dynamics, this approach works. But online software exhibits radically different market dynamics than installable software, which breaks those links. This creates a dilemma. IP incentives are broken for online software, but reworking existing IP rules would break IP incentives for offline software.

We need a more resilient way to distinguish between beneficial and harmful copying. This Article argues for a market-based approach to the legal protection of software.¹⁷ While IP laws are the default mechanisms

12. See *infra* Section II.C.

13. See *infra* Sections III.B.2.a, V.A.

14. See *infra* Section II.C.3.

15. See *infra* Section II.A.

16. *Comput. Assocs. Int'l, Inc. v. Altai, Inc.*, 982 F.2d 693, 712 (2d Cir. 1992).

17. While the specific market dynamics at issue have changed over the past thirty years, the core insights motivating this Article's approach overlap heavily with Samuelson, Davis, Kapor, and Reichman's famous "Manifesto" on software IP. See Pamela Samuelson, Randall Davis, Mitchell D. Kapor & J.H. Reichman, *A Manifesto*

for restricting the copying of intangibles, they are not the only tools available. Using elements drawn from state misappropriation laws, this Article offers one potential framework for distinguishing between “good” and “bad” copying and describes how that framework could be integrated into existing consumer protection laws and trade regulations.¹⁸

Part I breaks software innovation into four categories by distinguishing between implementations versus interfaces, which receive differing legal treatment, and innovative versus disruptive innovation, which involve differing market incentives.

Part II traces the co-evolution of software markets and software innovation law. Sections II.A and II.B show how software-specific IP doctrine was designed to promote software production and competition. They highlight the specific market dynamics that led to IP rights that apply almost exclusively to implementations and to IP and antitrust laws that permit (and sometimes promote) the copying of interfaces. Section II.C discusses how the move from installable software to online services inverted the market dynamics motivating the laws discussed in the previous Sections.

Part III describes how market dynamics, company size, and innovation law affect innovation incentives in the online service context, running through each of the categories of innovation introduced in Part I. It finds that three categories of innovation are sufficiently incentivized by the market (rendering IP protection redundant) but tend to be easier for large incumbents (exacerbating market concentration). The remaining category—disruptive interface innovation—is different. Disruptive interface innovation is critical to expanding consumer choice and is primarily generated by smaller companies. But disruptive interface innovation is particularly susceptible to copying, and copying by incumbents raises high-impassible barriers to entry and growth. Worse, recent competition regulation may exacerbate this problem.

Part IV lays out a plan for reform. It notes that IP laws focus on innovation and expression, while software IP doctrine developed around production and competition concerns. It proposes replacing IP rights in software with market-based rules, sketching one approach to implementing that reform.

Concerning the Legal Protection of Computer Programs, 94 COLUM. L. REV. 2308, 2365 (1994) [hereinafter *Software Copyright Manifesto*].

18. See *infra* Part IV. The specific protections contemplated in this approach extend to market protection, using an economic justification that parallels the defense of patent protection for business methods put forward by Michael Abramowicz and John F. Duffy. See Michael Abramowicz & John F. Duffy, *Intellectual Property for Market Experimentation*, 83 N.Y.U. L. REV. 337, 344–45 (2008).

Part V provides a trio of case studies that illustrate and support this Article's account of online market dynamics. It also discusses how the reforms in Part IV might apply to those cases.

I. SOFTWARE INNOVATION

Costs, market effects, and social impact can vary across different kinds of innovation, even within the same field. By adjusting incentives, IP rules influence both the speed and the direction of innovation.¹⁹ This Article centers on online software for general consumers. Within that field, it distinguishes innovation along two dimensions.

First, it distinguishes between *interfaces* and *implementations*.²⁰ Interfaces are the externally observable features of a piece of software.²¹ This includes user interfaces (UIs) that let users interact with software, application programming interfaces (APIs) that let computer programs interact with each other, and the software's observable behavior.²²

19. See Kevin A. Bryan & Jorge Lemus, *The Direction of Innovation*, 172 J. ECON. THEORY 247, 248 (2017) (providing a model of directional innovation incentives); Josh Lerner & Scott Stern, *Introduction* to *THE RATE AND DIRECTION OF INVENTIVE ACTIVITY REVISITED* 16–22 (Josh Lerner & Scott Stern eds., 2012) (reviewing ways in which innovation policy analysis considers the rate and direction of innovation). See also Michael J. Meurer & Katherine J. Strandburg, *Patent Carrots and Sticks: A Model of Nonobviousness*, 12 LEWIS & CLARK L. REV. 547, 549 (2008) (discussing the use of patent standards to guide research in productive directions).

20. In “Software Copyright Manifesto,” Samuelson, Davis, Kapor, and Reichman make a similar distinction between “text”—the computer code that comprises the program—and “behavior”—the way the program operates. *Software Copyright Manifesto*, *supra* note 17, at 2315–18.

21. The language separating software's appearance, behavior, and implementation is somewhat convoluted. “Design” and “interface” are terms of art both in software engineering and IP law but have different meanings in each context. While this Article uses the term “interface,” and my definition hews more closely to usage of the term in legal scholarship, my inclusion of behavior hews more closely to software design literature. Compare JONATHAN BAND & MASANOBU KATOH, *INTERFACES ON TRIAL: INTELLECTUAL PROPERTY AND INTEROPERABILITY IN THE GLOBAL SOFTWARE INDUSTRY* 6–8 (1995) (defining “interfaces” to refer to software/software and software/hardware boundaries, and including “interface specifications” within the scope of his definition), and Mark A. Lemley & Pamela Samuelson, *Interfaces and Interoperability After Google v. Oracle*, 100 TEX. L. REV. 1, 3, 5 n.19 (2021) (using “interface” to refer to APIs and, in passing, UIs), with Christopher Buccafusco & Mark A. Lemley, *Functionality Screens*, 103 VA. L. REV. 1293, 1296 (2017) (treating functionality as a standalone concept). Similarly, “infrastructure” might be slightly more descriptive than “implementation,” but I reserve the word “infrastructure” to include non-computer program factors like hardware and organizational resources when discussing capacity advantages. See *infra* Part III.

22. Courts and commentators distinguish between APIs and UIs, as APIs are more relevant to interoperability discussions, and user interfaces—especially graphical user interfaces—may have independent expressive elements. See, e.g., Howard A. Skaist,

Implementations are the invisible technologies powering an interface. For example, a calculator's interface includes the screen, the buttons, and the fact that typing an equation into the calculator will cause it to display the computed value of that equation. The calculator's implementation includes the arrangement of the calculator's circuitry because a user of the device could not differentiate between behavior of calculators with equivalent circuitry.

Within interfaces, this Article adopts a standard distinction between *disruptive* and *incremental* innovation.²³ Disruptive innovation introduces something entirely new; incremental innovation improves on existing products. For example, Instagram's phone-and-image-first approach to social media was disruptive, while Amazon's slightly easier-to-click menu options were incremental.²⁴ The incremental/disruptive distinction is more of a gradient than a sharp boundary, and the critical difference in this analysis is a matter of degree. If the pre- and post-innovation versions of a product are not close substitutes, then the innovation is disruptive.

Hybrid IP Rights for Software, APIs, and GUIs: Understanding Copyright's Paradigm Shift, 30 CATH. U. J. L. & TECH. 1, 22 (2021) (discussing this distinction). The differences between UIs and APIs are largely orthogonal to my incentive analysis. See *infra* Section III.B and accompanying footnotes (discussing why this Article omits that distinction).

23. Distinguishing between innovations that create a new technology and innovations that improve an existing technology has been a staple of innovation analysis and IP law for over a century. For example, Judge Hand famously distinguished "pioneer patents" as different in kind from an "advance over the prior art." *Wright Co. v. Paulhan*, 177 F. 261, 264 (C.C.S.D.N.Y. 1910). See also, e.g., Laura G. Pedraza-Fariña & Ryan Whalen, *A Network Theory of Patentability*, 87 U. CHI. L. REV. 63 (2020) (using this distinction to support a nuanced model of non-obviousness); Greg Satell, *The 4 Types of Innovation and the Problems They Solve*, HARV. BUS. REV. (June 21, 2017), <https://hbr.org/2017/06/the-4-types-of-innovation-and-the-problems-they-solve> [<https://perma.cc/S2TP-YREE>] (distinguishing between "sustaining" innovation and several kinds of trend-breaking innovations).

24. For a more detailed discussion of Instagram, see *infra* Part V. Amazon's 2012 menu redesign involved impressive ingenuity, but it did not perceptibly change the set products available in the market. Though the progenitor of the easier-to-click drop-down menu is lost to time, it made waves when adopted by Amazon in 2012. See, e.g., Ben Kamens, *Breaking down Amazon's Mega Dropdown*, BEN KAMENS (Mar. 6, 2013), <https://bjk5.com/post/44698559168/breaking-down-amazons-mega-dropdown> [<https://perma.cc/275R-GSM3>].

	Implementation	Interface
Incremental	<i>e.g.</i> , faster algorithms better computers	<i>e.g.</i> , easier-to-use menus
Disruptive		<i>e.g.</i> , a new kind of app

Table 1. A Rough Taxonomy of Software Innovation.

These distinctions are analytically useful because they roughly divide software innovation into categories with similar legal status and market dynamics. The interface/implementation divide played a key role in the development of software IP law, as explored in more detail in Part II. Disruptive and incremental innovation in software interface designs exhibit different economies of scale, a difference that contributes to Part III's analysis of innovation incentives. This Article argues that disruptive interface innovation (bottom-right in Table 1) is particularly important to online innovation but is discouraged by current IP laws.

II. SOFTWARE INNOVATION LAW

This Part breaks the co-evolution of software markets and software innovation law into three epochs: the emergence of software as a standalone product, the rise of platform software, and the move from installable programs to online services. It explains why IP protection is limited to implementations, why that policy made sense in the first two epochs, and why it does not make sense in the online context.

A. Standalone Software

Early computer programs were purpose-built and integrated with specific hardware.²⁵ Hardware manufacturers had an incentive to develop software that made their hardware useful, so they often bundled software with hardware or service contracts.²⁶ Starting in the 1960s, the development of the operating system (OS)—a special program that runs

25. NAT'L COMM'N ON NEW TECH. USES OF COPYRIGHTED WORKS, FINAL REPORT OF THE NATIONAL COMMISSION ON NEW TECHNOLOGICAL USES OF COPYRIGHTED WORKS 10–11 (1978) [hereinafter CONTU REPORT].

26. See Stephen Breyer, *The Uneasy Case for Copyright: A Study of Copyright in Books, Photocopies, and Computer Programs*, 84 HARV. L. REV. 281, 344–45 (1970).

other programs—allowed for a new class of hardware-agnostic software to emerge.²⁷ A program written to run on an operating system will work on any computer with that operating system.²⁸

Writing a computer program was expensive, and programs were easily copied.²⁹ With software no longer tightly coupled to hardware, manufacturers' incentive to write software diminished. To produce software profitably, creators need to recoup their cost of production. As copying gets easier, those costs are spread across fewer sales. In the most extreme case, a firm would need to recoup their entire costs on the first sale.³⁰ Some kind of copy protection was needed to encourage the development of general-purpose software.³¹

The task of designing software IP fell to the Commission on New Technological Uses of Copyrighted Works (CONTU), which Congress created in 1974 to study how new copying technologies affected copyright.³² CONTU's drafters agreed that standalone software needed some kind of copy protection.³³ They disagreed on the appropriate legal mechanism for that protection.³⁴

Computer programs are highly functional, which might recommend them for patent protection. Patent law gives inventors an exclusive right to practice novel, non-obvious, useful inventions for a term of roughly twenty years. That exclusion extends to cases of independent discovery.³⁵ Unlike the other forms of IP protection, inventors must apply for and receive a patent.³⁶ But the availability of patent protection for computer

27. See MARTIN CAMPBELL-KELLY, *FROM AIRLINE RESERVATIONS TO SONIC THE HEDGEHOG: A HISTORY OF THE SOFTWARE INDUSTRY* 125 (2003).

28. WILLIAM STALLINGS, *OPERATING SYSTEMS: INTERNALS AND DESIGN PRINCIPLES* 69–75 (9th ed. 2018).

29. Breyer, *supra* note 26, at 343.

30. CONTU REPORT, *supra* note 25, at 11 (imagining four ways a creator can cover the cost of production: (1) through the first sale; (2) spread across copies; (3) through a patron, such as a government or foundation; and (4) the creator is willing to bear the cost of production themselves).

31. See *id.* But see Breyer, *supra* note 26, at 344 (arguing against software copyright despite the high cost of production and risk of copying because the original developer has a know-how advantage that makes them more likely to receive installation and support contracts). This Article borrows the adjective “general purpose” from Breyer, who uses the term to distinguish standalone software from software bundled with specific hardware or customer built for a specific customer. *Id.* at 345.

32. Act of Dec. 31, 1974, Pub. L. No. 93-573, §§ 201–08, 88 Stat. 1873, 1873–75. See also CONTU REPORT, *supra* note 25, at 1, 4.

33. CONTU REPORT, *supra* note 25, at 12.

34. *Id.*

35. See 35 U.S.C. §§ 100–05.

36. See 35 U.S.C. §§ 111, 151. See also *Applying for Patents*, USPTO, <https://www.uspto.gov/patents/basics/apply> [<https://perma.cc/7SAC-G3RH>].

programs was unclear at the time of the report (and arguably still is).³⁷ And patent law's novelty requirement would not extend to companies selling competing, equivalent products.³⁸

The incentives at issue with computer programs seemed to mesh better with copyright law's mechanics. Copyrights let authors prevent unauthorized reproductions of expressive works, including the creation of derivative works, for several decades.³⁹ Copyright protection applies automatically once an expressive work is fixed in any tangible medium.⁴⁰ Automatic protection was the right tool for preventing software piracy, but the functional and intangible nature of computer programs fit awkwardly into a law designed around expression on physical media.⁴¹

CONTU's final report endorsed copyright protection for computer programs.⁴² CONTU's model legislation was adopted almost verbatim in the Software Copyright Act of 1980.⁴³

B. Software Platforms

As computers became more ubiquitous, software development grew into a fully fledged industry.⁴⁴ By the 1990s, consumers and businesses purchased hardware and software separately, often buying many programs from different vendors and running those programs simultaneously on a single computer.⁴⁵ Though the industry structure changed, the dynamics that motivated CONTU's recommendations

37. CONTU REPORT, *supra* note 25, at 17.

38. *Id.* at 16–17.

39. 17 U.S.C. §§ 102–03, 106, 302. The exact term of protection depends on a number of factors and has changed over time, but that nuance is not important to this Article.

40. 17 U.S.C. § 102(a).

41. CONTU REPORT, *supra* note 25, at 20–22.

42. *Id.* at 1. The decision was not unanimous. Some commentators were worried that software copyright went against the law's purpose of promoting expression. John Hersey, *Dissent of Commissioner Hersey*, in CONTU REPORT, *supra* note 25, at 29, 36. Commentators also took issue with the use of copyright to protect utilitarian works. *See, e.g.*, Pamela Samuelson, *CONTU Revisited: The Case Against Copyright Protection for Computer Programs in Machine-Readable Form*, 1984 DUKE L.J. 663, 727–28. Some commissioners and commentators were also concerned that software bundled with IP-protected products might effectively receive overlapping IP rights. *See* Melville B. Nimmer, *Concurrence of Commissioner Nimmer*, in CONTU REPORT, *supra* note 25, at 27. *See also* Breyer, *supra* note 26, at 344–45.

43. *Compare* CONTU REPORT, *supra* note 25, at 12, *with* Computer Software Copyright Act of 1980, Pub. L. No. 96-517, § 117, 94 Stat. 3015, 3028–29.

44. CAMPBELL-KELLEY, *supra* note 27, at 122–23.

45. *See id.* at 234, 236.

remained. Software development still had high upfront costs, and new technologies like CDs and the internet made copying easier than ever.

Interoperability between programs became an important feature of the software market. Programs that run on the same computer or interact with the same data often need to work together. For example, this Article was written using Microsoft Word on a computer running Apple MacOS. When the author saved the Article, Word passed data to MacOS, which saved it to a hard drive. The Article was formatted on Adobe Acrobat, which needed to understand Word's data format and MacOS's communication protocol.⁴⁶ For the author to switch from Word to another editor like WordPerfect, he would first need to confirm that WordPerfect is compatible with MacOS, can save documents in the PDF format, and can opening existing Word documents. Without that interoperability, it would not be possible to switch editors without also switching those other programs and converting existing projects into a new format.

The need for interoperability added a wrinkle to CONTU's scheme. To build interoperable products, market entrants could reverse-engineer or copy an incumbent's interface, but only if that copying was permitted by IP laws.⁴⁷ Copyright protection arguably left room for interface copying, though licensing remained a common practice well into the '90s.⁴⁸ If copying required permission, every major software developer could block market access by withholding that permission.⁴⁹ Referencing these competitive concerns, courts clarified that copyright provides little to no protection for software interfaces. At the same time, the Supreme Court whittled down patent coverage for software behavior, and antitrust started to view attempts to prevent software interoperability with suspicion.⁵⁰

46. Microsoft only provided documentation of the Word file format after an E.U. competition case compelled it to. *See* Case COMP/C-3/37.79 — *Microsoft*, 2007 O.J. (L 32) 23, 23; Case T-201/04, *Microsoft Corp. v. Comm'n*, 2007 E.C.R. II-3619, ¶ 278.

47. *See* Gary R. Ignatin, *Let the Hackers Hack: Allowing the Reverse Engineering of Copyrighted Computer Programs To Achieve Compatibility*, 140 U. PA. L. REV. 1999, 2000 (1992).

48. *See* Pamela Samuelson, *Functionality and Expression in Computer Programs: Refining the Tests for Software Copyright Infringement*, 31 BERKELEY TECH. L.J. 1215, 1221–23 (2016) (discussing the boundaries of copyright protection for software). *See also* Buccafusco & Lemley, *supra* note 21, at 1350–51 (reviewing the ways functionality is reserved to patent law).

49. *See, e.g., United States v. Microsoft Corp.*, 253 F.3d 34 (D.C. Cir. 2001) (arguing Microsoft exercised this power). *See also* Christopher Buccafusco, Mark A. Lemley & Jonathan S. Masur, *Intelligent Design*, 68 DUKE L.J. 75 (2018) (reviewing many of the risks of overprotection of functionality, including interfaces, and describing some of the ways overprotection occurs).

50. *See infra* notes 90–96 and accompanying text.

One of the first appellate cases to grapple with the copyrightability of interfaces was the Second Circuit's 1992 decision in *Computer Associates v. Altai*.⁵¹ The case involved Altai's reimplementing of part of Computer Associates' (CA) "scheduler" software.⁵² Schedulers are responsible for allocating resources between programs running on the same computer. Programs tell the scheduler which tasks they would like to run, the scheduler determines the order in which those tasks should be run and runs them on the computer.⁵³ Altai copied part of CA's scheduler that other programs used to register tasks.⁵⁴ The Second Circuit reasoned that the copied interfaces were the software equivalent of a genre trope: Altai could not create scheduling software unless that software could understand scheduling requests.⁵⁵ In operationalizing their copyright analysis, the Second Circuit created the "abstraction-filtration-comparison" test. The test inspects an alleged copy at different layers of abstraction, discards the non-protectable parts at each layer, and then asks whether whatever remains is substantially similar to the original and therefore a copyright violation.⁵⁶ Applying their test, the court threw out the copied interoperability code and affirmed that what remained was not substantially similar and therefore not a copyright violation.⁵⁷ Following *Altai*'s lead, later cases applying the abstraction-filtration-comparison test tend to throw out API design in the "filtration" step.⁵⁸

51. *Comput. Assocs. Int'l, Inc. v. Altai, Inc.*, 982 F.2d 693 (2d Cir. 1992).

52. *Id.* at 696. Recall that an application programming interface is an interface that allows communication between programs. *See supra* Part I.

53. This is a bit of an over-simplification. The Wikipedia article on job schedulers offers some more detail without getting too technical. *See Job Scheduler*, WIKIPEDIA, https://en.wikipedia.org/wiki/Job_scheduler [<https://perma.cc/PJ7T-7ANM>].

54. *Altai*, 982 F.2d at 699–701.

55. *Id.* at 706 (applying the *scènes à faire* doctrine—which denies copyright protection for genre tropes in literature). *See also id.* at 707–13 (outlining the abstraction-filtration-comparison test). The abstraction-filtration-comparison test created an apparent circuit split with *Whelan Assocs., Inc. v. Jaslow Dental Lab'y, Inc.*, 797 F.2d 1222 (3d Cir. 1986), which provided copyright in the structure of a program. In contrast to the Second Circuit's genre trope analogy, the Third Circuit analogized to a work of literature's (copyrightable) plot. *Compare Whelan*, 797 F.2d at 1234, with *Altai*, 982 F.2d at 709. *Whelan* is a bit of an outlier and has limited modern influence compared to *Altai*, *Lotus*, and their progeny.

56. *Altai*, 982 F.2d at 706.

57. *Id.* at 714.

58. The first two cases to adopt the abstraction-filtration-comparison test demonstrate this approach. *Sega v. Accolade* and *Atari v. Nintendo* each involved APIs that video game programs could use to "unlock" a video game console, which were copied by unauthorized game manufacturers. In both cases, the Ninth and Federal Circuits adopted the abstraction-filtration-comparison test. In *Sega*, the Ninth Circuit removed the API in question at the "filtration" step. *Sega Enters. Ltd. v. Accolade, Inc.*,

Around the same time as *Altai*, the First Circuit's *Lotus v. Borland*⁵⁹ decision raised the question of interoperability in user interfaces.⁶⁰ The case involved the hotkeys and menu structures in the popular "Lotus 1-2-3" spreadsheet software.⁶¹ 1-2-3 users operated the software by navigating a menu hierarchy using a keyboard. For example, typing "/Fs" (menu → File → Save) would save a spreadsheet, and "/wgf,0"⁶² could change how the spreadsheet displays numbers larger than a cell.⁶³ Sophisticated 1-2-3 users could record common sequences of keystrokes as replayable "macros."⁶⁴ Complicated macros were hundreds of commands long and automated tasks like running scientific calculations or generating invoices.⁶⁵ Unless Borland could copy the 1-2-3 menu structure and hotkeys, businesses switching to Borland's software would need to rebuild all their macros and retrain all their employees.⁶⁶ Holding that Lotus 1-2-3's menu structure was an uncopyrightable "method of operation," the court rejected Lotus's copyright claim.⁶⁷ *Lotus* was affirmed per curiam by an equally divided Supreme Court.⁶⁸ Barring a few notable exceptions in the Third and Federal Circuits,⁶⁹ *Lotus* and

977 F.2d 1510, 1524 (9th Cir. 1992). In *Atari*, the Federal Circuit found that literal copying of code was likely a copyright violation, but that the reverse-engineered APIs were not. *Atari Games Corp. v. Nintendo of Am. Inc.*, 975 F.2d 832, 845 (Fed. Cir. 1992) ("Atari's efforts to reverse engineer the 10NES chip to learn the ideas in the program will not alone support a copyright infringement claim."). In a more recent case involving printer cartridges and roughly analogous facts, the Sixth Circuit applied similar reasoning to *Altai* to reject copyright protection for a "locking" API. *Lexmark Int'l, Inc. v. Static Control Components, Inc.*, 387 F.3d 522, 544 (6th Cir. 2004). See also Samuelson, *supra* note 48, at 1221 (contrasting the Sixth Circuit's use of merger doctrines with the abstraction-filtration-comparison test's foundation in *scènes à faire*); *Gates Rubber Co. v. Bando Chem. Indus., Ltd.*, 9 F.3d 823, 838–39 (10th Cir. 1993) (rejecting copyright protection for a series of reading comprehension tests at the filtration step but withholding judgment on interfaces in general).

59. *Lotus Dev. Corp. v. Borland Int'l, Inc.*, 49 F.3d 807 (1st Cir. 1995).

60. See *id.* at 815. Recall that a user interface is an interface that allows communication between a program and a user. See *supra* Part I.

61. *Lotus Dev. Corp.*, 49 F.3d at 809–10.

62. (menu → worksheet → global → format → [overflow] → [hide if more than zero characters exceed]). LOTUS DEV. CORP., LOTUS 1-2-3 RELEASE 1.1 (1991).

63. See LOTUS, @FUNCTIONS AND MACROS GUIDE: LOTUS 1-2-3 RELEASE 2.3, at 91–111 (1991).

64. *Id.* at 92.

65. See, e.g., Edward M. Rosen, *The Use of Lotus 1-2-3 in Engineering Calculations*, CHEM. ENG'G EDUC., Spring 1990, at 100, 100.

66. *Lotus Dev. Corp.*, 49 F.3d at 818.

67. *Id.*

68. *Lotus Dev. Corp. v. Borland Int'l, Inc.*, 516 U.S. 233 (1996) (per curiam).

69. See, e.g., *Whelan Assocs., Inc. v. Jaslow Dental Lab'y, Inc.*, 797 F.2d 1222 (3d Cir. 1986); *Oracle Am., Inc. v. Google LLC*, 886 F.3d 1179 (Fed. Cir. 2018), *rev'd*, 141 S. Ct. 1183 (2021).

Altai began a general trend of courts rejecting copyright claims involving software interfaces.⁷⁰

In 2020, the Supreme Court revisited copyright for software interfaces in *Google v. Oracle*.⁷¹ The case involved the copying of Oracle's Java API during the development of Google's Android operating system in 2007.⁷² After licensing negotiations between Google and Oracle broke down, Google re-implemented several hundred Java programs.⁷³ The copied work included verbatim copies of the programs' interfaces and documentation as well as exact reproductions of their behavior.⁷⁴ The Court's decision sidestepped the question of whether APIs are copyrightable subject matter, instead holding that Google's copying was fair use as a matter of law.⁷⁵ In dicta, Justice Stephen Breyer's decision raised concern for external dependencies reminiscent of *Lotus* and *Altai*.⁷⁶ While UI copyright has not reached the Supreme Court since *Lotus*,⁷⁷ appellate courts have generally treated allegations of UI copyright infringement with even more skepticism than API infringement.⁷⁸

A similar thread in patent law limits protection for software behavior. Two clusters of Supreme Court cases lay out the boundaries of utility patent eligibility for software. In an early trio of cases, the Supreme Court rejected patent protection for algorithms that merely capture abstract ideas or facts of nature.⁷⁹ In a more recent quartet of

70. See JONATHAN BAND & MASANOBU KATOH, INTERFACES ON TRIAL: INTELLECTUAL PROPERTY AND INTEROPERABILITY IN THE GLOBAL SOFTWARE INDUSTRY 83–136 (Routledge 2019) (1995).

71. *Google LLC v. Oracle Am., Inc.*, 141 S. Ct. 1183 (2021). While this case was decided in 2022 and involves smartphones, it concerns behavior that predates the online services epoch and technology that runs on consumer devices. Thus, it falls under the gamut of standalone software rather than online software.

72. *Id.* at 1190–91.

73. *Id.* at 1191.

74. *Id.* at 1193.

75. *Id.* at 1184. See Lemley & Samuelson, *supra* note 21.

76. *Oracle*, 141 S. Ct. at 1208 (citing, paraphrasing, and expanding on a concurrence from *Lotus Dev. Corp. v. Borland Int'l, Inc.*, 49 F.3d 807, 821 (1st Cir. 1995) (Boudin, J., concurring)).

77. *Lotus* and *Oracle* both involve interfaces that lie somewhere in the grey area between UIs and APIs. The distinction is not particularly important to this Article's analysis.

78. See, e.g., *Apple Comput., Inc. v. Microsoft Corp.*, 35 F.3d 1435 (9th Cir. 1994). See also Jane M. Rolling, *No Protection, No Progress for Graphical User Interfaces*, 2 MARQ. INTELL. PROP. L. REV. 157, 166–70 (1998).

79. *Gottschalk v. Benson*, 409 U.S. 63, 66–68 (1972) (stating that an algorithm for converting numbers from base 2 to base 10 was an unpatentable fact of nature); *Parker v. Flook*, 437 U.S. 584, 594–95 (1978) (stating that an alarm that goes off when it passes a certain threshold is an unpatentable abstract idea); *Diamond v. Diehr*, 450 U.S. 175,

cases, the Court declared that business methods are unpatentable and that adding a computer to the mix does not make a process patentable.⁸⁰ Two of those cases, *Alice*⁸¹ and *Mayo*,⁸² establish a two-step test for determining the patentability of computer methods.⁸³ The test asks if an algorithm is “directed” to an unprotectable idea and, if so, if some extra inventive step transforms the computer running the algorithm into something new and patentable.⁸⁴

Despite the apparent limitations, software patents comprise a growing majority of Patent and Trademark Office (PTO) applications and grants each year.⁸⁵ Pure software patents remain a highly active area of litigation with a decent success rate in district courts and the Federal Circuit.⁸⁶

Unlike copyright and utility patents, design patents offer some IP rights in software interfaces. Design patents are an increasingly popular mechanism for protecting the “look and feel” of a piece of software.⁸⁷

175–76 (1981) (stating that an algorithm that computes a cutoff and triggers an action when that cutoff is reached is patentable).

80. *Bilski v. Kappos*, 561 U.S. 593 (2010); *Ass’n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 580 (2013); *Mayo Collaborative Servs. v. Prometheus Lab’ys, Inc.*, 566 U.S. 66, 70 (2012); *Alice Corp. v. CLS Bank Int’l*, 573 U.S. 208, 212 (2014).

81. *Alice Corp. v. CLS Bank Int’l*, 573 U.S. 208 (2014).

82. *Mayo Collaborative Servs. v. Prometheus Lab’ys Inc.*, 566 U.S. 66 (2012).

83. *Id.* at 72; *Alice*, 573 U.S. at 212.

84. *Mayo Collaborative Servs.*, 566 U.S. at 78; *Alice*, 573 U.S. at 217–18.

85. *U.S. Patent Statistics Chart, Calendar Years 1963–2020*, USPTO, https://www.uspto.gov/web/offices/ac/ido/oeip/taf/us_stat.htm [<https://perma.cc/2K89-QG5N>] (Mar. 20, 2024) (noting that a software patent is categorized as a utility patent) [hereinafter *Patent Statistics*]. Cross-referencing the list of software-related patent classes with the PTO’s application and grant statistics shows that software patent grants and applications have grown as a percentage of total applications every year since 2001 (except 2014) and currently make up over sixty percent of total filings and grants. See Stuart Graham & Saurabh Vishnubhakat, *Of Smart Phone Wars and Software Patents*, 27 J. ECON. PERSPS. 67, 75 n.7 (2013) (providing a list of patent classes).

86. See, e.g., *Bascom Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1343 (Fed. Cir. 2016); *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1316 (Fed. Cir. 2016); *Data Engine Techs. LLC v. Google LLC*, 906 F.3d 999, 1013 (Fed. Cir. 2018); *Finjan, Inc. v. Blue Coat Sys., Inc.*, 879 F.3d 1299, 1306–08 (Fed. Cir. 2018); *SRI Int’l, Inc. v. Cisco Sys., Inc.*, 930 F.3d 1295, 1304 (Fed. Cir. 2019).

87. Trademark protection for the “look and feel” of software is extremely limited. See Peter Lee & Madhavi Sunder, *The Law of Look and Feel*, 90 S. CAL. L. REV. 529 (2017); Benjamin C.R. Lockyer, *Trying on Trade Dress: Using Trade Dress To Protect the Look and Feel of Video Games*, 17 J. MARSHALL REV. INTELL. PROP. L. 109 (2017). Though there are few test cases, video game IP commentators suggest that a combination of the functionality bar, the Copyright Act’s preemption clause, and the difficulty of demonstrating secondary meaning shortly after the release of a product all render trademark law ineffective at protecting software interfaces in general. See, e.g.,

But that protection is limited to non-functional, novel aspects of a computer interface.⁸⁸ A few high-profile smartphone cases have successfully asserted design patents for semi-functional interface design decisions.⁸⁹

Antitrust enforcers also engaged with the interoperability question. *U.S. v. Microsoft*⁹⁰ gives many examples of the competitive challenges raised by the software market.⁹¹ In that case, the Department of Justice's (DOJ) allegations included the assertion that Microsoft used its control over the APIs in its Windows operating system to give its own software offerings an unfair market advantage.⁹² The DOJ also alleged that Microsoft used its monopoly power in the operating system market to block new technologies that might facilitate OS-agnostic software, just as operating systems had facilitated hardware-agnostic software years earlier.⁹³ Following a convoluted trial and an appeal by Microsoft, the D.C. Circuit issued a 100-plus-page opinion that affirmed, in relevant part, the factfinding supporting the DOJ's API allegations.⁹⁴ The decision acknowledged the importance of interoperability in allowing market access and facilitating future competition.⁹⁵ In the settlement that followed, Microsoft was required to make its APIs and associated documentation available to third parties.⁹⁶

In sum, today's software innovation rules maintain CONTU's protections against the copying of software implementations but limit those protections by explicitly allowing the copying of software interfaces. The justifications for these policies stem from the observed competitive dynamics of the industry. Literal copying of software is not allowed because copying is cheap and easy, and software developers need to sell multiple copies of their programs to recoup the cost of

Tanner Robinson & Max Metzler, *2012 Video Game Industry Litigation Review*, 16 SMU SCI. & TECH. L. REV. 1 (2013).

88. See Pamela Samuelson, *Are Patents on Interfaces Impeding Interoperability?*, 93 MINN. L. REV. 1943 (2009); Jane M. Rolling, *No Protection, No Progress for Graphical User Interfaces*, 2 MARQ. INTELL. PROP. L. REV. 157 (1998).

89. Most notably, *Samsung Elecs. Co. v. Apple Inc.*, 580 U.S. 53 (2016) (affirming the validity design patents for rounded corners and app icon arrangements).

90. *United States v. Microsoft Corp.*, 253 F.3d 34 (D.C. Cir. 2001).

91. *Id.* at 46–47.

92. Complaint at 2–6, *United States v. Microsoft Corp.*, 87 F. Supp. 2d 30 (D.D.C. 2000) (No. 98CV01232).

93. *Id.*

94. *Microsoft*, 253 F.3d at 66. See also Findings of Fact at 16–23, *Microsoft*, 87 F. Supp. 2d 30 (Nov. 5, 1999) (No. 98-1232).

95. *Microsoft*, 253 F.3d at 74–75, 77.

96. Final Judgment at 4, *Microsoft*, 253 F. Supp. 2d 30 (Nov. 12, 2002) (No. 98-1232).

development. Interface copying is allowed because it is often required to allow new entrants market access.

C. Online Software

In the early 2010s, the consumer software industry transitioned from selling products to providing services. The shift was triggered by the mass adoption of smartphones. Smartphones gave the typical consumer two internet-connected computers: their phone and their personal computer. Users wanted access to their digital “stuff” from any computer. For example, most people reading this Article probably use their phone and laptop interchangeably to check their email and expect all their mail to be available from both devices. Software firms responded to this demand by moving online. Rather than selling installable programs as a product, companies run software in-house and provide remote access as a service.⁹⁷

1. CHANGE IN COSTS

The move from installable products to online services inverted many of the software industry’s cost structures and competitive dynamics. In concert, these effects destroy the market dynamics that motivated the current software IP regime.

Upfront development costs dropped with the move online. Since installable programs need to work “out of the box,” they must include all essential features, work in a variety of environments, be compatible with a wide range of hardware, and interoperate with a variety of different programs. Since firms cannot easily observe or alter installable programs once they have shipped, installable software is designed to work for long periods of time with minimal monitoring or maintenance. All that development effort necessarily occurred upfront. By contrast, software built for online services only needs to work on the service provider’s computers. And the service providers have ongoing access to the program, meaning they can add features and fix low-probability problems on the fly. The ability to spread development effort over the life of the program removes much of the risk and almost all of the upfront cost of online software development.⁹⁸

97. For a longer discussion of this shift, see David Stein, *Data Insecurity Law*, 39 SANTA CLARA HIGH TECH. L.J. 445, 467–68 (2023).

98. See Seda Gürses & Joris van Hoboken, *Privacy After the Agile Turn*, in CAMBRIDGE HANDBOOK OF CONSUMER PRIVACY 579 (Evan Selinger, Jules Polonetsky & Omar Tene eds., 2018); CHRISTOPH SCHMIDT, AGILE SOFTWARE DEVELOPMENT TEAMS: THE IMPACT OF AGILE DEVELOPMENT ON TEAM PERFORMANCE 7–9 (2016).

Marginal distribution costs exploded with the move online. For installable programs, the cost of adding another user is negligible: just print another installation CD or allow another download. For online services, adding a new user means adding and maintaining enough computing capacity to run software and store data on that user's behalf.⁹⁹ For a single product, development costs hold relatively constant while infrastructure costs grow with the number of people using that product. For popular services, the cost of infrastructure dominates all other costs.¹⁰⁰

Piracy risks evaporated with the move online. For installable software, literal copying can be as easy as burning a CD. Reverse-engineering installable software typically involves obtaining and investigating a complete working copy of the program. For services, the computer program never leaves company-owned servers and is never publicly visible in any form.¹⁰¹

2. CHANGE IN MARKET DYNAMICS

The nature of competition also changed with the move to online services. These new competitive dynamics negate the interoperability and competition concerns that motivated limitations on copy protection for interfaces.

Market differentiation works differently online. While a more efficient algorithm or more portable implementation played a differentiating role in installable software, it is invisible in the online context.¹⁰² For example, if installable software runs inefficiently, customers with older hardware might not be able to use the program. If online services run inefficiently, firms can either improve their software or upgrade their computers. From a customer's perspective, the

99. *But cf.* Michael Kades & Fiona M. Scott Morton, Interoperability as a Competition Remedy for Digital Networks 14 (Feb. 2021) (unpublished manuscript) (arguing that the marginal cost of providing backend services for an API is zero because the necessary connective physical infrastructure already exists and “[t]ransferring digital files has almost zero cost”).

100. *See, e.g.*, Facebook, Inc., Annual Report 66–67 (Form 10-K) (Jan. 27, 2021) (citing data centers and technical infrastructure as the reason for increased cost of revenue and using user growth and engagement to project future costs).

101. 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, 467 (2018).

102. The effects of costs on prices are more complex. If better implementation lowers costs, that might facilitate price competition. But because many online services are zero-price, price differentiation is harder to achieve. For a longer discussion of price effects, see *supra* Part III.

performance improvement is the same. Online software is exclusively differentiated by its behavior and interface.

The technical barriers to market access also differ. Interoperability requires service providers to connect to each other, which involves both technical and contractual connections.¹⁰³ No amount of reverse-engineering, interface copying, or technical compatibility can force those connections on their own.¹⁰⁴ Instead, market access is often gated by access to infrastructure or network effects. For example, a firm's computing capacity determines the number of users they can support,¹⁰⁵ and for services with social features, social factors can increase customer switching costs.¹⁰⁶

Online service providers approach IP rights differently than offline software companies. Online services' near-instantaneous distribution and low upfront costs make it quicker and easier to launch an app. Market cycles move quickly, and startups can begin experimenting with significantly less initial funding. The median patent application review takes longer than it would take for the average startup to run out of

103. For example, when my software is running on a provider's computer, they need to take affirmative action to connect with another service; when my software runs on my own machine, I can tinker with its functionality however I want. The difference between online and offline interoperability requirements is made more confusing by overuse of the term "API"—which refers to any software/software interface, including interfaces between programs and interfaces between independent infrastructures. Compare, for example, the discussion of interoperability between online platforms in Fiona M. Scott Morton, Gregory S. Crawford, Jacques Crémer, David Dinielli, Amelia Fletcher et al., *Equitable Interoperability: The "Super Tool" of Digital Platform Governance* 1–5 (Tobin Ctr. for Econ. Pol'y, Pol'y Discussion Paper No. 4, 2021) (concerning interoperability as mutual access to a firm's infrastructure), with BAND & KATOH, *supra* note 21, at 5–8 (discussing interoperability as a mutual ability to implement a technical standard).

104. In fact, this has led to a market for consolidating services. For example, Segment is a company that facilitates interoperability with hundreds of providers so that they do not need to constantly cross-coordinate with each other when a new piece of software enters the ecosystem. See SEGMENT, <https://segment.com/> [<https://perma.cc/F3U3-98EQ>].

105. See *supra* Section III.A.

106. Switching social platforms requires communities to either adopt new platforms en masse or communicate across platforms. The use of multiple platforms seems to be the norm. One source estimates the average person uses between six and seven social media platforms. Rohit Shewale, *Social Media Users 2024 (Global Data and Statistics)*, DEMANDSAGE (Mar. 4, 2024), <https://www.demandsage.com/social-media-users/> [<https://perma.cc/J7KT-QUX3>]. In general, which online or offline switching costs are higher is context dependent. See generally Herbert Hovenkamp, *Gatekeeper Competition Policy*, MICH. TECH. L. REV. (forthcoming) (discussing online switching costs in much greater detail).

money.¹⁰⁷ Filing a single patent application costs about as much as a month of a software engineer's salary.¹⁰⁸ Given the delay, patents are only useful for innovations that remain relevant for a span of years. Few fast-pivoting startups are stable enough to benefit from a patent.¹⁰⁹ In fact, patents are often a liability for startups seeking investment because a patent portfolio indicates to investors that a startup either does not understand the market or does not understand how to budget their time and money efficiently.¹¹⁰ Thus, patents are only meaningfully available to larger online service providers.

3. CONCENTRATION OF ONLINE DIGITAL PLATFORMS

The rise of a small number of dominant online consumer services creates several social and economic policy challenges. A small number of online platforms wield unprecedented influence over civic discourse, commerce, and access to information.¹¹¹ Ad-based business models led

107. Compare Jason D. Rowley, *VC Has Gotten Bigger but, It Turns Out, Not Much Faster*, CRUNCHBASE NEWS (Nov. 26, 2018), <https://news.crunchbase.com/data/the-time-between-vc-rounds-is-shrinking/> [<https://perma.cc/9NS7-KRVP>] (reporting that the median time between funding rounds is just under twenty months), with USPTO, ANNUAL REPORT 2022 – WORKLOAD TABLES tbl.4 (2022) (reporting a 26.6-month average pendency for patents in the “Computer Architecture, Software and Information Security” category and a 25.2-month average pendency overall).

108. See AM. INTELL. PROP. L. ASSOC., REPORT OF THE ECONOMIC SURVEY 2021, at 42 (2021) (showing an average software patent cost of roughly \$10,000).

109. Even before the online switch, software was a fast-iterating industry that often combined innovations, and commentators have noted these issues for decades. See, e.g., Julie E. Cohen & Mark A. Lemley, *Patent Scope and Innovation in the Software Industry*, 89 CALIF. L. REV. 1, 11–13 (2001).

110. See, e.g., Tim Berry, *Startups Beware: Patents Are Like Umbrellas. False Confidence.*, BPLANS: PLANNING, STARTUPS, STORIES, <https://timberry.bplans.com/startups-beware-patents-are-like-umbrellas-false-confidence/> [<https://perma.cc/64Q7-VJ7G>]; Ben Lee, *You Don't Need a Patent for Your App. Here's Why*, INC. (Oct. 12, 2018), <https://www.inc.com/ben-lee/you-dont-need-a-patent-for-your-app-heres-why.html>; Richard Feloni, *'Shark Tank' Investor Barbara Corcoran Reveals the Worst Mistakes Aspiring Entrepreneurs Make*, BUS. INSIDER (May 21, 2015, 3:18 PM), <https://www.businessinsider.com/shark-tank-barbara-corcoran-entrepreneur-mistakes-2015-5> [<https://perma.cc/EJM2-9W2U>]; Josiah Humphrey, *Why New Startups Don't Need Patents*, MEDIUM: THE STARTUP (June 30, 2017), <https://medium.com/swlh/why-new-startups-dont-need-patents-a9e83e688510> [<https://perma.cc/HY7L-W352>].

111. See Kate Klonick, *The New Governors: The People, Rules, and Processes Governing Online Speech*, 131 HARV. L. REV. 1598, 1603 (2018); Evelyn Douek, *Content Moderation as Systems Thinking*, 136 HARV. L. REV. 526, 530–32 (2022); Kate Klonick, *The Facebook Oversight Board: Creating an Independent Institution To Adjudicate Online Free Expression*, 129 YALE L.J. 2418, 2423–24 (2020). But see

to the construction of a growing private surveillance infrastructure, and participation in modern digital life essentially requires opting into being monitored by that infrastructure.¹¹² Huge pools of data create privacy and security risks for consumers.¹¹³ “Rein[ing] in big tech” has become a bipartisan goal.¹¹⁴

Lawmakers and commentators largely turned to competition law for solutions to the concentration of online consumer services. But many of the traditional indicia of monopoly power and anticompetitive harm are based on price effects, which are difficult to measure in zero-price and multi-sided markets like ad-tech.¹¹⁵ Instead, some competition authorities focus on potential future harms, while others view concentrated markets as fundamentally problematic.¹¹⁶ Whatever the motivation, competition regulators have begun to adjust their definitions of anticompetitive harm to address these dynamics.¹¹⁷

Ganesh Sitaraman, *Deplatforming*, 133 YALE L.J. 497, 508–17 (2023) (noting that this influence is neither unprecedented nor unique to tech).

112. See TIM WU, *THE ATTENTION MERCHANTS: THE EPIC SCRAMBLE TO GET INSIDE OUR HEADS* 341–43 (2016).

113. See, e.g., Danielle Keats Citron, *Reservoirs of Danger: The Evolution of Public and Private Law at the Dawn of the Information Age*, 80 S. CAL. L. REV. 241, 244–48 (2007); Daniel J. Solove & Danielle Keats Citron, *Risk and Anxiety: A Theory of Data-Breach Harms*, 96 TEX. L. REV. 737, 756–58 (2018); DANIEL J. SOLOVE & WOODROW HARTZOG, *BREACHED! WHY DATA SECURITY LAW FAILS AND HOW TO IMPROVE IT* 17–21 (2022).

114. Lindsey Graham & Elizabeth Warren, Opinion, *When It Comes to Big Tech, Enough Is Enough*, N.Y. TIMES (July 27, 2023), <https://www.nytimes.com/2023/07/27/opinion/lindsey-graham-elizabeth-warren-big-tech-regulation.html>.

115. “Platform markets”—in which a platform intermediates in transactions between two other parties—present unique challenges in antitrust because competition for access to one “side” of the market might adversely affect customers on the other side. See Jean-Charles Rochet & Jean Tirole, *Platform Competition in Two-Sided Markets*, 1 J. EUR. ECON. ASS’N 990, 991–93 (2003); *Ohio v. Am. Express Co.*, 585 U.S. 529, 533–36 (2018).

116. See, e.g., Lina M. Khan, Note, *Amazon’s Antitrust Paradox*, 126 YALE L.J. 710, 747–49, 755 (2017) (characterizing Amazon’s practice of setting prices below the competitive equilibrium as a way to reduce competition in the long term); C. Scott Hemphill, *Disruptive Incumbents: Platform Competition in an Age of Machine Learning*, 119 COLUM. L. REV. 1973, 1975–78 (2019) (discussing accumulation of data and training of AI models as a type of barrier to entry); TIM WU, *THE CURSE OF BIGNESS: ANTITRUST IN THE NEW GILDED AGE* 54–55 (2018).

117. Most notably, the DOJ and FTC’s proposed changes to their merger guidelines introduce a number of new indicia of potentially anticompetitive effects, including new structural presumptions, new non-price factors for the hypothetical monopolist test, and explicit attention to “nascent competitive threat[s].” Compare DEP’T OF JUST. & FTC, *MERGER GUIDELINES* 18–20, 41–42 (2023), https://www.ftc.gov/system/files/ftc_gov/pdf/2023_merger_guidelines_final_12.18.2023.pdf [https://perma.cc/PF8B-YGPN], with DEP’T OF JUST. & FTC, *HORIZONTAL*

One competition policy movement, concentrated mainly in the U.S., attempts to reduce market consolidation by challenging incumbent acquisitions of small, innovative companies.¹¹⁸ While enforcers had previously allowed acquisitions of small companies, they now consider the acquiree's potential to grow into a competitive threat to the acquirer.¹¹⁹ By blocking or unrolling the acquisition of nascent competitors, competition authorities aim to prevent incumbent services from snuffing out potential sources of disruption to their core business.¹²⁰ This theory has motivated recent high-profile cases, including challenges to Facebook's acquisition of Instagram and Google's acquisition of DoubleClick.¹²¹ While the European Union has also applied more scrutiny to potential nascent competitors, its legislative response to platform concentration focuses more on behavioral remedies like access to APIs.¹²²

MERGER GUIDELINES 3 (2010), <https://www.justice.gov/sites/default/files/atr/legacy/2010/08/19/hmg-2010.pdf> [<https://perma.cc/8WP8-YBVZ>] (giving substantial weight to post-merger price changes), and DEP'T OF JUST. & FTC, VERTICAL MERGER GUIDELINES 3 (2021), https://www.ftc.gov/system/files/documents/public_statements/1580003/vertical_merger_guidelines_6-30-20.pdf [<https://perma.cc/MR3T-XFLS>] (withdrawn in 2021) (considering actual effects observed post-merger, direct comparisons, and disruptive role of merging party).

118. See, e.g., *FTC To Examine Past Acquisitions by Large Technology Companies*, FTC (Feb. 11, 2020, 1:00 PM), <https://www.ftc.gov/news-events/news/press-releases/2020/02/ftc-examine-past-acquisitions-large-technology-companies> [<https://perma.cc/CWS9-3HF8>]; Gail Levine, *A Busy Six Months*, FTC (July 8, 2020), <https://www.ftc.gov/enforcement/competition-matters/2020/07/busy-six-months> [<https://perma.cc/3RQC-NAET>].

119. See *supra* notes 115–16.

120. See C. Scott Hemphill & Tim Wu, *Nascent Competitors*, 168 U. PA. L. REV. 1879, 1886–90 (2020).

121. See Complaint at 4–6, *FTC v. Facebook, Inc.*, 581 F. Supp. 3d 34 (D.D.C. Dec. 9, 2020) (No. 20-cv-03590); Complaint at 6–7, *United States v. Google LLC*, No. 23-cv-00108 (E.D. Va. Jan. 24, 2023).

122. Notably, the Digital Services Act and Digital Markets Act both require large online platforms to offer interoperability to the general market. Mandated interoperability tries to stimulate competition by mandating technical measures that would give market entrants access to incumbents' networks, data, and services, thereby removing barriers to entry by removing the difficulty in bootstrapping up to the point of being able to leverage network effects and data advantages. See Scott Morton, Crawford, Crémer, Dinielli, Fletcher et al., *supra* note 103, at 6. See also Herbert Hovenkamp, *Antitrust Interoperability Remedies*, 123 COLUM. L. REV. F. 1, 10–15 (2023), <https://columbialawreview.org/content/antitrust-interoperability-remedies/> [<https://perma.cc/YT84-GGR3>] (analyzing the benefits and drawbacks of this approach). For an example of E.U. competition enforcers challenging mergers under a nascent competition theory, see *Start-Ups, Killer Acquisitions and Merger Control*, OECD, <https://www.oecd.org/daf/competition/start-ups-killer-acquisitions-and-merger-control.htm> (last visited Apr. 6, 2024).

This new approach to competition regulation places a strong emphasis on market entry and growth.¹²³ Blocking the acquisition of nascent competitors theoretically allows those companies to grow into actual competitors or be acquired by a less dominant competitor, thereby diversifying the market.¹²⁴ Mandating interoperability attempts to remove a perceived barrier of entry and increase the number of market entrants.¹²⁵ While both of these approaches have some intuitive appeal, they depend on the dual assumptions that (1) the online service market has sufficient, sustainable entrepreneurial activity to provide a steady flow of new entrants; and (2) at least some of those entrants are capable of growing into viable competitors.

The next Part argues that practical market effects and IP rules both strongly discourage entrepreneurial activity, innovation, and growth in the market for online consumer services. It identifies several factors that mitigate these stifling effects (albeit inefficiently). But it warns that interventions by competition regulators risk destroying these mitigating factors, thereby increasing the market concentration those regulators aim to address.

III. ONLINE SOFTWARE INNOVATION INCENTIVES

This Part examines how costs, scale, and IP rules shape innovation incentives for each of the categories of innovation introduced in Part I. Each Section first describes how technical constraints and market practicalities affect incentives for an innovation category, then explores how IP rules adjust those incentives. The analysis shows that three categories of innovation are sufficiently incentivized by the market (rendering IP protection redundant) but tend to be easier for large incumbents (exacerbating market concentration). The remaining category, disruptive interface innovation, is primarily generated by smaller companies and plays a critical role in promoting innovation and competition. But disruptive interface innovation is particularly susceptible to copying by incumbents, which raises significant barriers to entry. Current IP and antitrust interventions only exacerbate this effect.

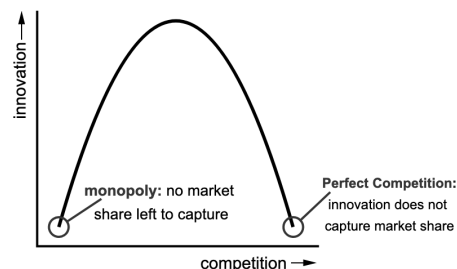
123. See, e.g., Kevin A. Bryan & Erik Hovenkamp, *Startup Acquisitions, Error Costs, and Antitrust Policy*, 87 U. CHI. L. REV. 331, 334–37 (2020).

124. See, e.g., Kevin A. Bryan & Erik Hovenkamp, *Antitrust Limits on Startup Acquisitions*, 56 REV. INDUS. ORG. 615, 616–18 (2020); Colleen Cunningham, Florian Ederer & Song Ma, *Killer Acquisitions*, 129 J. POL. ECON. 649, 651 (2021); Hemphill & Wu, *supra* note 120, at 1880–81.

125. E.g., Scott Morton, Crawford, Crémer, Dinielli, Fletcher et al., *supra* note 103, at 5–6.

When firms innovate, they earn a little bit of market power that lets them temporarily “escape” competition and extract rents.¹²⁶ Viewed through the lens of innovation policy, IP laws reduce competition to reward innovation and antitrust laws preserve the baseline competition that gives IP rewards value.¹²⁷ Effective innovation policy requires balance. Overaggressive IP grants create harmful restrictions on innovation and trade,¹²⁸ while inescapable competition can destroy innovation rewards.¹²⁹

126. The idea, in broad strokes, goes something like this: without competition, innovation confers no advantage (an observation often associated with Kenneth J. Arrow), but under perfect competition, a firm could not extract any monopoly rents to recoup the cost of innovation (an observation often associated with Joseph A. Schumpeter). See, e.g., Philippe Aghion, Nick Bloom, Richard Blundell, Rachel Griffith & Peter Howitt, *Competition and Innovation: An Inverted-U Relationship*, 120 Q.J. ECON. 701, 703–04, 710–11 (2005); Michael Peneder & Martin Woerter, *Competition, R&D and Innovation: Testing the Inverted-U in a Simultaneous System*, 24 J. EVOLUTIONARY ECON. 653, 656–58 (2014). See also Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources for Invention*, in NAT’L BUREAU OF ECON. RSCH, *THE RATE AND DIRECTION OF INVENTIVE ACTIVITY: ECONOMIC AND SOCIAL FACTORS* 609, 617–19 (1962); JOSEPH A. SCHUMPETER, *CAPITALISM, SOCIALISM AND DEMOCRACY* 117–19 (2010). In markets exhibiting Schumpeterian dynamics, competition is often viewed as competition for IP rights, since at any given time, one firm might have enormous—but unstable—market power. E.g., DEP’T OF JUST. & FTC, *ANTITRUST GUIDELINES FOR THE LICENSING OF INTELLECTUAL PROPERTY* 2–3 (2017), <https://www.justice.gov/atr/IPguidelines/download> [https://perma.cc/6DM5-VZBX] (describing innovation markets).



127. For a much deeper discussion of this relationship, see Jonathan B. Baker, *Beyond Schumpeter vs. Arrow: How Antitrust Fosters Innovation*, 74 ANTITRUST L.J. 575, 575–79 (2007).

128. See MICHAEL HELLER, *THE GRIDLOCK ECONOMY: HOW TOO MUCH OWNERSHIP WRECKS MARKETS, STOPS INNOVATION, AND COSTS LIVES* 1–2, 49–54 (2010); JAMES BESSEN & MICHAEL J. MEURER, *PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK* 95–98 (2008).

129. See sources cited *supra* note 124. CONTU’s original fears are an example of inescapable competition: If everyone can immediately copy an innovation, why would anyone bear the costs of research and development? See CONTU REPORT, *supra* note 33, at 11.

The appropriate balance of IP rights and competition depends on the innovation in question for a couple of reasons. First, different kinds of innovation might experience different market dynamics. Consider the previous Part's discussion of implementations and interfaces: early software implementations faced too much competition from copies, so policymakers created IP rights to prevent those copies and reduce competition; but early software interfaces created competition-reducing market power, so policymakers allowed—and sometimes encouraged—copying of interfaces to increase competition.¹³⁰ Second, some innovation has more social value. Policymakers can use IP and competition rules to nudge innovators towards normatively preferable efforts.¹³¹

Company size is often a relevant factor in analyzing innovation incentives. When it is more expensive to bring a novel product to market than a copied product, firms will rationally prefer copying to innovation.¹³² Innovation, copying, and go-to-market costs can vary based on firm size, meaning some market conditions only incentivize “upward” or “downward” copying between incumbents and startups. During the platform software epoch, incumbents very rarely had an incentive to copy from new entrants, while entrants were often required to copy from incumbents to participate in the market. Thus, the right to copy interfaces primarily applied to entrants copying incumbents.¹³³ As this Part shows, in the online context, that assumption no longer holds.

130. See *supra* Part II.

131. For example, the Orphan Drug Act extended patent protection to old and otherwise unpatentable drugs that need additional testing and certification, which encouraged the modernization of abandoned but potentially effective drugs. Pub. L. No. 97-414, § 155, 96 Stat. 2049, 2065–66 (1983). Meanwhile, the America Invents Act removed the patent eligibility of tax avoidance strategies to discourage research into tax dodging techniques. Leahy-Smith America Invents Act, Pub. L. No. 112-29, §14, 125 Stat. 284, 327–28 (2011).

132. The “bring a novel product to market” piece is often overlooked, but it is critical: I can make a pixel-for-pixel clone of the Instagram app in under a week, but I do not have the user network or infrastructure to compete with Meta. See *infra* Part V. This also explains many “low-IP” markets: for example, in fashion, bringing a copy to market would diminish a brand’s image as an innovator, thus the cost of copying exceeds the cost of innovating. See, e.g., Kal Raustiala & Christopher Sprigman, *The Piracy Paradox: Innovation and Intellectual Property in Fashion Design*, 92 VA. L. REV. 1687, 1718 (2006).

133. Commentary on software interfaces continues to analyze interface copying as a mechanism that targets incumbents to enable interoperability and produce substitutes. See, e.g., Clark D. Asay, *Software’s Copyright Anticommons*, 66 EMORY L.J. 265, 296 (2017). See generally JONATHAN BAND, INTERFACES ON TRIAL 3.0: GOOGLE V. ORACLE AMERICA AND BEYOND (2016).

A. Implementations

Implementation innovations improve invisible, internal technologies that power software applications, including algorithms, data structures, programming languages, and technical architectures.¹³⁴ This Section's account finds that implementation innovation favors larger companies, that there are sufficient incentives for implementation innovation without IP, and that IP rights in implementations are overprotective.

1. MARKET INCENTIVES

Implementation innovation does little to drive market demand for online software. Where offline software needed to be compatible with a customer's operating system and hardware, online services do not; a website running on Windows and one running on Linux are indistinguishable.¹³⁵ Similarly, while inefficient installable software would consume a customer's electricity and computing resources, efficiency in the online context alters a provider's margins instead of their product's quality. For example, there is no easily observable difference between a service that upgrades the efficiency of its algorithms and a service that upgrades its computing hardware; they are both just faster.¹³⁶

Implementation innovations have little inherent risk of being copied. Online software runs on service providers' computers, so competitors and customers have no way to observe, reproduce, or appropriate computer code. Absent theft, implementation details can be kept secret.¹³⁷ Even if implementations are stolen or leaked, they may not be usable by competitors. Backend software is often written to take advantage of a provider's technical eccentricities and contractual relationships. Running

134. This Section groups incremental and disruptive implementation innovation together.

135. To build intuition, consider the following: Bing's backend only works on Windows servers; Google's backend only works on Linux servers. Is that relevant to your choice of search provider?

136. In some industries, lower costs allow for market differentiation through lower prices, but online consumer service markets often contain zero-price, ad-supported options, leaving little room for price differentiation. See John M. Newman, *Antitrust in Zero-Price Markets: Foundations*, 164 U. PA. L. REV. 149 (2015). Even in markets for paid products, economies of scale in physical hardware and maintenance play an outsized role in determining costs; cost savings through software innovation plays a negligible role in most price setting.

137. There is a rich literature on a host of normative and legal issues raised by the inscrutability of cloud systems that is outside the scope of this Article. See, e.g., Sonia K. Katyal, *The Paradox of Source Code Secrecy*, 104 CORNELL L. REV. 1183 (2019); JULIE E. COHEN, *BETWEEN TRUTH AND POWER: THE LEGAL CONSTRUCTIONS OF INFORMATIONAL CAPITALISM* (2019).

that code requires access to an analogous set of infrastructures and agreements.¹³⁸

Experiments in implementation innovation are measured by their ability to make infrastructure run more efficiently. The efficacy of an implementation can be tested by using it to run some of a service's infrastructure and measuring its use of resources. Those tests are rarely externally detectable, so even the direction of research and development (R&D) efforts can be kept secret.

The benefits of implementation improvements accrue as a company grows. As discussed in Part II, the cost of running a service grows with the number of users, while the cost of writing a program holds roughly constant. Since software efficiency improvements decrease per-user marginal costs, the relative and absolute benefit of those improvements is highest for the biggest services. The advantages of implementation innovation can have compounding effects as proportional development costs shrink and cost savings grow.¹³⁹ Building infrastructure involves huge capital outlays. Most small companies rent computers from major incumbents, who lease their excess capacity. This practice simultaneously underwrites capital investment by big companies (decreasing their scaling costs) and limits small companies' incentives to engage in implementation innovations that do not affect their rental costs.

Implementation innovation is sometimes necessary to grow beyond a certain scale. Running interactive online services at global scale is a new problem in general, and some scaling challenges are product-specific or only have trade-secret solutions.¹⁴⁰ When companies encounter a scaling challenge without well-known solutions, they are forced to innovate to continue to grow. Since infrastructure designs never need to

138. For example, Google computers do not even use standard networking protocols when communicating with other Google computers. Cade Metz, *Revealed: The Secret Gear Connecting Google's Online Empire*, WIRED (June 17, 2015, 12:30 PM), <https://www.wired.com/2015/06/google-reveals-secret-gear-connects-online-empire/>.

139. Reconfigurability is also relevant here since reconfigurable infrastructures can react to changing demand across a product portfolio but can also make it much easier to enter new markets at scale. See Lina M. Khan, *Sources of Tech Platform Power*, 2 GEO. L. TECH. REV. 325, 328 (2018).

140. For example, see this blog post on some of the unique challenges Twitter faced in running upgrades at scale without turning off the website: Ameet Kotian, *Manhattan Software Deployments: How We Deploy Twitter's Large Scale*, X: ENG'G (May 9, 2016), https://blog.twitter.com/engineering/en_us/topics/insights/2016/manhattan-software-deployments-how-we-deploy-twitter-s-large-scale-distributed-database [<https://perma.cc/QNC6-CV4W>].

be disclosed, many scaling challenges must be re-solved by every company.¹⁴¹

Thus, sufficiently large companies are rewarded for improved implementations with lower costs and faster production. Those innovations have little risk of being copied. Even when there are copy risks, the combination of cost savings and the need to solve novel scaling challenges continues to promote innovation. But smaller companies may not grow large enough for the benefits of implementation improvements to justify their fixed costs.

2. LEGAL INCENTIVES

Given preexisting rewards for innovation and practical barriers to copying, there is not a strong need for IP rights in online software implementations. Yet those implementations receive multiple forms of IP rights, some of which amplify incumbent advantages.

Multiple IP regimes apply concurrently to online services' implementing code. Trade secret law protects code running on provider-owned servers, which is also protected by copyright law. To the extent that the code implements a patent, patent law applies too. When code requires secret know-how or IP-protected hardware to run, it effectively adds the practical and legal copy protections associated with those connected infrastructures to the software.

The patent system provides special advantages to online incumbents by amplifying first-mover capacity advantages. Even naïve solutions to new infrastructural challenges often receive patents because they are novel and lack documented prior art demonstrating non-obviousness.¹⁴² Later movers are denied the use of that "obvious" solution when they hit similar scaling challenges. The prevalence of patent grants for obvious infrastructure and algorithms is a common grumbling point among software engineers at platform companies.¹⁴³

141. For example, other companies solved analogous scaling challenges to the one discussed in the previous note but tailored solutions to their unique infrastructural needs. *See, e.g.,* Chuck Rossi, *Rapid Release at Massive Scale*, ENG'G META (Aug. 31, 2017), <https://engineering.fb.com/2017/08/31/web/rapid-release-at-massive-scale/> [<https://perma.cc/2WBM-FQ2Y>]; Mathias Schwarz, *Uber Engineering's Micro Deploy: Deploying Daily with Confidence*, UBER BLOG (June 23, 2016), <https://www.uber.com/blog/micro-deploy-code/>.

142. *See supra* note 139 and accompanying text (discussing the inherent novelty of scaling challenges).

143. *See, e.g.,* *Patents*, ELEC. FRONTIER FOUND., <https://www EFF.org/issues/patents> [<https://perma.cc/284Z-38P9>]; Robert Purvy, *Software Obviousness: The Disconnect Between Engineers and the Patent System* (Feb. 23, 2014) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2399580

In sum, the market encourages implementation innovation but concentrates that innovation at large companies, which expands the technology gap between incumbents and new entrants. Many forms of IP law apply concurrently to implementations. Though those rules provide few market rewards, they may enhance incumbent advantages and increase barriers to entry.

B. Interfaces

Interface innovation improves software's externally observable properties, including the user interfaces that let users interact with software, the application programming interfaces that let computer programs interact with each other, and the software's observable behavior. As discussed above, interface design has outsized importance in differentiating online services; many distinguishing factors that are important for installable software—like efficiency, portability, and compatibility—do not matter online, where consumers can only differentiate between products by their ease of use and capabilities.

The efficacy of a software interface is measured by its ability to drive demand, and new interfaces are validated through market experimentation.¹⁴⁴ Few people—if any—can predict which interfaces will work.¹⁴⁵

There is limited IP protection for interfaces.¹⁴⁶ Since design experiments occur in the open, trade secret plays a limited role. Copyright and trademark play a similarly marginal role. Design patents provide some protections but typically take over a year to grant—much

[<https://perma.cc/CU3W-FPFU>]. See also Mark A. Lemley, Essay, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495, 1495–97 (2001) (discussing factors that lead to over granting of patents at the PTO); James Bessen, *A Generation of Software Patents*, 18 B.U. J. SCI. & TECH. L. 241, 242 (2011) (citing surveys dating back to the '90s showing software engineers' distaste for software patents).

144. Tech companies and venture capitalists spend billions of dollars and centuries of engineering time in a never-ending search for new and better “product-market fit.” If investors could predict which interactions and behaviors would resonate with users, they would not invest in so many failed products.

145. Often even the creators of successful designs are surprised by the change that triggers its success. See ANTONIO GARCIA MARTINEZ, *CHAOS MONKEYS: OBSCENE FORTUNE AND RANDOM FAILURE IN SILICON VALLEY* (2018) (“For the makers of most consumer apps . . . the miracle was quite simple: getting users to use your app . . . [t]he uniqueness and complete fickleness of such a miracle are what make investing in consumer-facing apps such a lottery.”); Jeremy Kahn, *The Inside Story of ChatGPT: How OpenAI Founder Sam Altman Built the World's Hottest Technology with Billions from Microsoft*, FORTUNE (Jan. 25, 2023, 4:30 AM), <https://fortune.com/longform/chatgpt-openai-sam-altman-microsoft/> [<https://perma.cc/687W-KDY9>] (quoting OpenAI CEO Sam Altman explaining that ChatGPT's success was a surprise).

146. See *supra* Part II.

longer than the average market cycle—meaning they are most valuable when a product is either expected to remain largely unchanged over several innovation cycles or the innovation can be applied to a variety of different products. Both cases favor companies with established, stable product lines, further accenting incumbent advantages in incremental interface innovation. Given the delay and speculative nature of design patents, they do little to adjust innovation incentives.¹⁴⁷

This Section explains why incremental interface innovation gets easier with growth while disruptive interface innovation gets harder, why disruptive interface innovation is particularly susceptible to copying, and why that copying hurts innovation, competition, and consumer choice.

1. INCREMENTAL INNOVATION

Iterative innovation benefits from a large userbase to experiment on, a relatively stable core product with predictable user engagement to act as a control, and the capacity to quickly iterate on multiple design experiments in parallel.¹⁴⁸ All these resources exhibit economies of scale. These innovations are not particularly susceptible to copying. While all interface innovation is at some risk of copying—it is done in the open, and re-development costs are small—incremental improvements build on established designs; only competitors with similar designs, use cases, and userbases would benefit from a borrowed improvement. Even then, copiers would likely need to validate whether the reproduced changes resonate with their own users and products, incurring many of the costs of in-house development.

The low copy risks and natural market power associated with incremental interface improvements render IP rights mostly unnecessary. With some limited exceptions for design patents, IP rights are also largely inapplicable to this class of innovation.¹⁴⁹

147. But see Sarah Burstein, *Moving Beyond the Criticisms of Design Patents*, 17 STAN. TECH. L. REV. 305, 330 (2013).

148. Iterative interface innovation is more science than art: small changes that do not disrupt major features, like button placements, colors, or copywriting, are easy to “A/B” test in parallel across a sufficiently large population. See generally Amy Gallo, *A Refresher on A/B Testing*, HARV. BUS. REV. (June 28, 2017), <https://hbr.org/2017/06/a-refresher-on-ab-testing> [<https://perma.cc/Q2W8-724U>]. Established tech companies can build entire teams and generic testing infrastructures dedicated to running and analyzing interface experiments. See, e.g., Ya Xu, Nanyu Chen, Adrian Fernandez, Omar Sinno & Anmol Bhasin, *From Infrastructure to Culture: A/B Testing Challenges in Large Scale Social Networks*, in KDD ’15: PROCEEDINGS OF THE 21ST ACM SIGKDD INTERNATIONAL CONFERENCE ON KNOWLEDGE DISCOVERY AND DATA MINING 2227, 2227 (2015) (discussing A/B testing infrastructure at LinkedIn).

149. See *supra* note 85 and accompanying text (discussing design and trademark protection of interfaces).

2. DISRUPTIVE INNOVATION

Disruptive interface innovation involves the development of new products and features that have no close substitute.¹⁵⁰ As the source of new products, this category of innovation is especially important to increasing consumer choice and developing new business models, both bipartisan policy priorities.¹⁵¹ This Section finds that disruptive interface innovation is essential to competition and deconcentration in the market for online consumer services but is highly susceptible to ruinous copying. The resulting economic incentives discourage innovation and entrepreneurial activity.

In contrast to every other category of innovation, disruptive innovation grows harder with scale. Disruptive experiments can place a company's entire brand and product portfolio at risk. New products are inherently less predictable than established products, and unintuitive interactions—especially those implicating users' security or privacy expectations—can trigger regulatory interventions that increase operational costs and slow development speed across the company for decades.¹⁵² Even when regulatory issues are not raised, attempts at disruptive innovation place brand goodwill at risk.¹⁵³ Major product changes or experimental apps that compete with existing products can displace or confuse loyal users.¹⁵⁴ Overlapping experiments associated

150. See *supra* Part I.

151. E.g., Graham & Warren, *supra* note 114.

152. For example, in 2010, Google added an experimental group messaging feature to Google. Some users found the sharing options confusing and shared data they wanted to keep private, which eventually led to regulatory intervention by the FTC. Complaint, *Google Inc.*, F.T.C. No. 102 3136 (Oct. 13, 2011). The resulting consent decree effectively requires legal review and a paper trail for “any change, addition, or enhancement to a product or service” for every Google division and subsidiary for twenty years. Agreement Containing Consent Order at 4, 7, *Google Inc.*, F.T.C. No. 102 3136 (Mar. 30, 2011). Over a decade later, the reviews required by the Google consent decree can still add weeks of delay to product launches, prevent feature experiments, and even block acquisitions and market expansion. See Parsh Dave, *The Obscure Google Deal that Defines America's Broken Privacy Protections*, WIRED (Dec. 20, 2023), <https://www.wired.com/story/google-consent-decree-ftc-broken-privacy-protections/>.

153. See, e.g., Jennifer Elias, *Google Execs Warn Company's Reputation Could Suffer if It Moves Too Fast on AI-Chat Technology*, CNBC (Dec. 13, 2022, 5:28 PM), <https://www.cnn.com/2022/12/13/google-execs-warn-of-reputational-risk-with-chatgpt-like-tool.html> [<https://perma.cc/CS6Z-X2FN>].

154. This effect is a form of “product cannibalization,” which is often attributed to K. Sridhar Moorthy & I. P. L. Png, *Market Segmentation, Cannibalization, and the Timing of Product Introductions*, 38 MGMT. SCI. 345, 345 (1992) (describing how a firm's new product might steal market share from its existing products, undercutting the rewards for product variety and innovation). For an example in the online service sector, see Chaim Gartenberg, *A Very Brief History of Every Google Messaging App*, VERGE (June 21, 2021, 11:15 AM), <https://www.theverge.com/2021/6/21/22538240/google->

with the same brand can interact oddly, and competing experiments can fragment the population of early adopters, making it harder for any single experiment to succeed.¹⁵⁵ Failures are costly: shutting down an app can devalue a brand's goodwill by alienating users, leaving them hesitant to depend on other products in the brand's portfolio or adopt new products in the future.¹⁵⁶ Beyond the risks of disruptive innovation, organizational inertia makes big changes at big companies hard.¹⁵⁷

Smaller companies are well-suited for disruptive interface design.¹⁵⁸ They have less goodwill and a smaller product portfolio placed at risk with each experiment. They have fewer users to alienate if the company needs to "pivot." There is more room for individual employees to implement big ideas. Perhaps most importantly: there are more small companies. When one startup's design fails, the startup's peers can observe and learn from that failure.

Disruptive interface innovation's inverted relationship with company size makes it critical to competition. Since every other form of innovation favors large incumbents, disruptive innovation is the only practical leverage small companies have to compete with large incumbents. Without properly incentivized disruptive innovation, new entrants have no way to differentiate themselves and establish a sustainable market presence. Ensuring that disruptive innovation is a viable competitive strategy is therefore critical to any policy that aims to increase consumer choice, decrease consumer tech concentration, or

chat-allo-hangouts-talk-messaging-mess-timeline [https://perma.cc/964Q-RYJU] (expressing points of confusion with Google's dozens of chat apps).

155. See Horacio E. Gutiérrez, *Peering Through the Cloud: The Future of Intellectual Property and Computing*, 20 FED. CIR. BAR J. 589, 589 (2011).

156. See Cody Ogden, *KILLED BY GOOGLE*, <https://killedbygoogle.com/> [https://perma.cc/K743-F5G8] (enumerating cancelled Google products). Can you trust Google apps to still exist when your company depends on them? On future adoption, suffice to say there will be no block-long lines for Snapchat's next camera glasses. See Kurt Wagner, *New Yorkers Are Lining up Around the Block and into the Subway To Buy Snap's New Spectacles*, *Vox* (Nov. 22, 2016, 4:58 PM), <https://www.vox.com/2016/11/22/13718956/snap-spectacles-new-york-store-line-wait> [https://perma.cc/G9ZB-MN4C]; *Snapchat Loses \$40m on Flop Spectacles*, *BBC* (Nov. 8, 2017), <https://www.bbc.com/news/technology-41915068> [https://perma.cc/3JWR-TANJ]. Switching costs are also lower for online services without social components. See Hovenjump, *supra* note 106 (manuscript at 8–10).

157. Deborah Dougherty & Cynthia Hardy, *Sustained Product Innovation in Large, Mature Organizations: Overcoming Innovation-to-Organization Problems*, 39 *ACAD. MGMT. J.* 1120, 1122 (1996).

158. Beyond the software-specific dynamics in this Article, small-company innovation advantages are a well-documented feature in many industries. See, e.g., Todd R. Zenger, *Explaining Organizational Diseconomies of Scale in R&D: Agency Problems and the Allocation of Engineering Talent, Ideas, and Effort by Firm Size*, 40 *MGMT. SCI.* 708 (1994).

encourage the development of alternatives to advertising-driven online products.

a. The Cloning Problem

Large incumbents have the incentive and ability to copy the disruptive interface designs created by new entrants. Implementing or copying a software interface is quick and easy because typical online development costs are low, and development effort is amortizable. But, as discussed above, validating a product can be expensive for large companies.

Larger platforms can copy smaller platforms' validated designs quickly enough to deny the smaller platform access to the market. The point at which a product is market-validated comes relatively early in the scaling process: a few million users can demonstrate a new interface's market appeal but represent a negligible share of the billions of people with internet access. Building the capacity to deliver an app at global scale requires massive investments of money and time.¹⁵⁹ After copying a design, a company with preexisting capacity can capture the market before smaller platforms can achieve sufficient scale. Established platforms can then force the original innovator out of the market by using their scale advantages in incremental innovation, synergies with other products, and network advantages.¹⁶⁰

Cloning risks undermine the incentives for disruptive interface innovation at small and mid-sized firms. With no alternative source of differentiation, they also undercut the expected rewards for entrepreneurial activity, which reduces the number of startups entering the market. Fewer startups means greater concentration and fewer potential innovators, which compounds these effects. And since large companies are also discouraged from disruptive interface innovation, no actor is rewarded for engaging in the kind of innovation that drives consumer choice and market evolution.

159. Scaling an online service requires solving a series of (often novel) infrastructure challenges. See *supra* note 139 and accompanying text. Scaling also requires establishing significant physical and organizational capacity. In some cases, some computing capacity can be rented from major tech services. E.g., *Amazon Web Services (AWS)*, AWS, <https://aws.amazon.com/> [<https://perma.cc/WN2D-JKC7>].

160. Cf. Khan, *supra* note 116, at 756, 780–82 (discussing advantages of structural dominance and providing examples of scale advantages through potentially predatory pricing of books, and the use of data advantages to quickly copy and displace promising products in the online marketplace for consumer goods).

b. Acquisitions as a Mitigating Factor

Though the reward for innovation in an appropriately regulated industry is a temporary grant of market power,¹⁶¹ some alternative mechanisms reward disruptive innovation in the online consumer services space. Most notably, acquisition prospects are a key driver of entrepreneurial activity.¹⁶² Many investors and founders view a high-priced acquisition as a successful outcome for a company.¹⁶³ Some commentators even argue that acquisitions are the preferred outcome in the tech startup ecosystem.¹⁶⁴ Basic economic reasoning would suggest that high acquisition rates should increase entrepreneurial and inventive activity: acquisition prices that exceed a founder's expected independent returns increase their reward for entry, and acquisition offers priced below expected independent returns should be rejected and have no effect.¹⁶⁵ But innovation, investment, and entrepreneurial activity are all depressed in the consumer tech space.¹⁶⁶ The specter of cloning offers a simple explanation for why startups might accept otherwise undervalued acquisition offers; if a startup's next best alternative to a buyout is oblivion, then their only source of bargaining power comes from competing offers, and their only choice is between offers.¹⁶⁷

Why would an incumbent acquire when they can copy, and why are prices sometimes so high? Incumbent platforms benefit from acquisitions, even when copying is an option. In the case of competition between platforms, acquisitions can provide a competitive edge in a few ways. First, companies can buy "negative" knowledge and know-how.¹⁶⁸

161. See *supra* note 160 and accompanying text.

162. See Mark A. Lemley & Andrew McCreary, *Exit Strategy*, 101 B.U. L. REV. 1 (2021).

163. *Id.* at 14.

164. *Id.* at 44–45.

165. Sai Krishna Kamepalli, Raghuram Rajan & Luigi Zingales, *Kill Zone* (Nat'l Bureau of Econ. Rsch., Working Paper No. 27146, 2020) (noting the same counterintuitive behavior).

166. *Id.* at 2.

167. A few other explanations exist in the literature. Lemley & McCreary, *supra* note 162, at 36, posit that time-sensitive liquidity pressure on venture capitalist partners motivates them to push for acquisitions, even at lower prices. This fails to account for the prevalence of rollover and rolling-window structures of modern tech funds and fails to explain why investment activity is lowest in a product space with heightened demand and capital devoted to acquisitions. Kamepalli, Rajan, and Zingales have a more complicated explanation based on network effects and switching costs, but the model assumes IP protections prevent copying; without that assumption, the complexity of the model falls away. Kamepalli, Rajan & Zingales, *supra* note 165, at 3.

168. See, e.g., UNIF. TR. SECRETS ACT § 1 cmt. (UNIF. L. COMM'N 1979) (amended 1985) (discussing negative knowledge). See also Charles Tait Graves, *The Law*

Specifically, the interface of an app discloses what works but does not expose learning from failed experiments. That knowledge is especially valuable if the acquirer wants to integrate the startup's innovations into an existing product rather than make an exact copy. Second, acquisitions can provide a competitive edge in the labor market.¹⁶⁹ In emerging fields there may only be a handful of experienced engineers. Acquisitions are a way to hire a team that works well together and has relevant interests and experience.¹⁷⁰ Third, an acquisition can let the acquirer distance a new offering from its core brand.

Incumbent platforms also benefit from the existence of an acquisition market because it motivates entrepreneurial activity.¹⁷¹ Many incumbents encourage entrepreneurial activity within their product areas through corporate venture funding, seed investments from executives, and programs that let employees use their sabbaticals to found startups. This makes sense if tech incumbents are looking for ways to foster innovation. These dynamics also help explain acquisition prices; companies with a reputation for offering attractive acquisition terms might attract more entrepreneurs to focus on solving problems within their product space.

Though inefficient at incentivizing innovation and ineffective at addressing market concentration, the acquisition prospects provide a reward for entrepreneurial activity and disruptive innovation in cases where direct competition is unlikely.¹⁷² The lower the chance of building

of Negative Knowledge: A Critique, 15 TEX. INTELL. PROP. L.J. 387, 391 (2007); Camilla A. Hrdy, *The Value in Secrecy*, 91 FORDHAM L. REV. 557, 571 (2022).

169. See John F. Coyle & Gregg D. Polsky, *Acqui-Hiring*, 63 DUKE L.J. 281, 293–94 (2013).

170. *Id.* at 294–97 (summarizing interviews with engineers and attorneys involved in acqui-hires).

171. Well-trodden innovation theory predicts that larger companies often look to the startup industry for disruptive innovation when they become incapable of doing it themselves. *E.g.*, Morton I. Kamien & Nancy L. Schwartz, *Market Structure and Innovation: A Survey*, 13 J. ECON. LITERATURE 1, 19 (1975) (summarizing research into the effect of firm size on innovative output).

172. Early “exit” opportunities—including acquisitions—have some secondary, socially beneficial properties that are often overlooked. For example, early exit opportunities have innovation-increasing properties because they allow innovators to iterate more quickly. Independent and high-valuation tech companies are disproportionately started by repeat founders. See ALI TAMASEB, *SUPER FOUNDERS: WHAT DATA REVEALS ABOUT BILLION-DOLLAR STARTUPS* 62 (2021). Acquisitions provide a way for founders whose company builds a promising feature that cannot function as a standalone product to cash out and try again. Making those cycles quicker increases the number of startups per founder over time, and making those cycles lucrative increases the number of inventive founders attracted to the space. Early exit opportunities can also help to protect digital rights by providing an alternative to desperate cash-grabs. Faced with the prospect of direct competition with an incumbent, firms tend to adjust

a stable company or growing that company into a large enterprise, the more important alternative payouts like acquisitions are to keeping expected returns high enough to attract new market entrants. Absent some mechanism to reduce cloning risk, new companies cannot grow large enough to compete with incumbent online consumer services and are relegated to either carving out niches between incumbents' product areas, courting acquirers, or moving out of the consumer software space.

Recently, a push to block the buyout of "nascent competitors" has put acquisition prospects at risk. Theorizing that incumbents acquire potential competitors to avoid future competition, proponents of this approach advocate for blocking or unrolling startup acquisitions when the acquiree might develop innovations that could pose a competitive threat to the acquirer.¹⁷³

But predicting the future of competition and innovation is imprecise at best, meaning this enforcement approach is inherently error prone.¹⁷⁴ Thus, much of the relevant commentary focuses on balancing the risks of under- and over-enforcement and reducing the chance of error.¹⁷⁵ In estimating the risks of under- and over-enforcement, proponents of aggressive merger review imagine counterfactuals where some unacquired startups continue to grow.¹⁷⁶ Blocking acquisitions, the argument goes, will create parallel lines of innovation, which will increase consumer choice and consumer surplus as some of those startups grow into actual competitors. Proponents of increased merger review are aware of the argument that acquisition prospects drive innovation but respond that the cost of allowing "killer" acquisitions greatly exceeds the cost of potential reductions in innovation incentives.¹⁷⁷ Proposals to

their business practices. When firms no longer have room to grow their product offerings or userbase, they rationally switch their focus to monetizing what they already have. The most deeply problematic practices in the tech ecosystems—like the mass sale of personal data and the adoption of dark patterns in payment gateways—occur when companies switch from attracting new users to squeezing value from the ones they already have. When problematic behavior is distributed across smaller, less visible companies, it often flies beneath the attention of enforcers and consumer advocates. *See, e.g.*, David Stein, *Data Insecurity Law*, 39 SANTA CLARA HIGH TECH. L.J. 445, 493–94 (2023) (observing that small firms with subpar cybersecurity practice often dodge regulatory attention).

173. *See, e.g.*, Hemphill & Wu, *supra* note 120; Pehr-Johan Norbäck, Lars Persson & Roger Svensson, *Creative Destruction and Productive Preemption* (Rsch. Inst. of Indus. Econ., Working Paper No. 799, 2014).

174. *See* Herbert Hovenkamp, *Antitrust and Platform Monopoly*, 130 YALE L.J. 1952, 2042 (2021).

175. *See* Amy C. Madl, *Killing Innovation?: Antitrust Implications of Killer Acquisitions*, 38 YALE J. ON REG. BULL. 28, 48 (2020).

176. *E.g.*, Hemphill & Wu, *supra* note 120, at 1882; STEVEN C. SALOP, OECD, JT03476203, POTENTIAL COMPETITION AND ANTITRUST ANALYSIS: MONOPOLY PROFITS EXCEED DUOPOLY PROFITS (2021).

177. *See, e.g.*, Hemphill & Wu, *supra* note 120, at 1893.

mitigate the risk of overenforcement fall into two camps. First, increasing the accuracy of merger review to avoid blocking productive mergers through increased discovery or by delaying the merger to let the market evolve.¹⁷⁸ These approaches try to reduce the information asymmetry between parties and enforcers through tactics like pausing mergers for a few months to let emerging market trends and acquisition strategies play out. Second, preserving some of the potential for acquisition payouts by only blocking acquisitions by the largest incumbents.¹⁷⁹

By overfocusing on individual acquisitions, this risk analysis overlooks the macro effect these policies could have on activity levels.¹⁸⁰ Decreasing expected outcomes creates a substitution effect that pushes entrepreneurs and investors away from consumer services.¹⁸¹ Forcibly preserving the competitive potential of one startup—even when that startup has competitive potential—reduces expected returns and discourages activity for the entire product space.

To be clear, this critique does not reject the idea that there is anticompetitive conduct in digital markets. Nor does it contest the argument that some tech acquisitions are anticompetitive. Instead, it questions whether startups can grow into competitive threats under the current backdrop of market incentives and IP rules. Fixing the underlying

178. *E.g.*, *id.* at 1905–06. *See also* Premerger Notification; Reporting and Waiting Period Requirements, 88 Fed. Reg. 42178 (proposed June 29, 2023) (to be codified at 16 C.F.R. pts. 801, 803) (proposing a longer HSR pre-merger screening process with increased reporting requirements).

179. *See, e.g.*, Hemphill & Wu, *supra* note 120, at 1893 (“To be sure, limiting anticompetitive acquisitions will sometimes eliminate the highest bidder, and to that extent reduces the returns from investing in the startup in the first place. However, startups are not an end in themselves. Investments are desirable to the extent that the public actually sees some benefit from the innovation and competition they provide. Lowered investment in startups that fail to provide these benefits, because they end up in the hands of an incumbent, is a feature of antitrust enforcement rather than a bug.”).

180. *But see* Louis Kaplow, *Entry and Merger Analysis*, 85 ANTITRUST L.J. 103 (2023) (discussing ex post entry and alluding to other ex post effects). “Ex post entry” describes a phenomenon where post-merger supracompetitive prices attract new competitors. *See* Gregory J. Werden & Luke M. Froeb, *The Entry-Inducing Effects of Horizontal Mergers: An Exploratory Analysis*, 46 J. INDUS. ECON. 525 (1998). Note that this effect only occurs when supracompetitive prices exceed competitive rates enough to exceed the cost of overcoming network effects and economies of scale. As Part II describes, online software markets are often zero-price and exhibit substantial scale advantages, negating the conditions necessary for that effect.

181. D. Daniel Sokol, *Vertical Mergers and Entrepreneurial Exit*, 70 FLA. L. REV. 1357 (2018). Note that the “only block the biggest actor” strategy is especially problematic here, since it stops the outlier high prices that result from bidding wars, which greatly reduces expected returns. *See, e.g.*, GARCÍA MARTINEZ, *supra* note 145, at 489 (describing the acquisition of Instagram by Facebook as involving a bidding war that drove up acquisition prices).

IP issue through policy reforms would let competition enforcers address structural issues without risking market entry rates and innovation levels.

IV. RECALIBRATING SOFTWARE IP RULES

As Part III shows, the market for online services features too much protection for implementations and too little protection for disruptive interfaces. Under the current regime, IP laws calcify incumbent advantages and undermine innovation and competition. Removing unnecessary protections for implementations and introducing new protections for disruptive interfaces would correct these effects in the online context.

But software IP is potentially well-tailored for installable software. And installable software is still an important market. The problem is that the innovation incentives and market dynamics associated with installable software look nothing like the incentives and dynamics associated with online services. Copyright protection for implementations should likely remain, and any new protections for interfaces must allow the copying permitted by *Lotus*, *Altai*, *Oracle*, and their progeny.

This Part sketches a program for IP reform: replace traditional IP protections with a copy protection scheme modeled after common law misappropriation. This approach would offer automatic, short-term protection against anticompetitive copying but set market-based limits on that protection's scope and term of protection. It leaves open the question of whether that copy protection should take the form of a private right of action or an agency-enforced market regulation, though this Section suggests there are reasons to prefer the latter. The intuition driving this proposal is that the difference between socially beneficial and harmful copying depends on the effect that copying has on the market. While the application of IP rules is gated by subject-matter analysis, unfair competition rules like the misappropriation doctrine focus on the competitive context in which the copying occurs.

Section IV.A begins by describing the proposed copy protections, then identifying which IP rights those protections should replace.

A. Adding Limited Protection for Software Interfaces

1. SETTING APPROPRIATE LIMITS ON SOFTWARE INTERFACE PROTECTION

Cloning software designs is not *always* problematic. Whether commentators and courts view cloning as normatively desirable seems to hinge on the *direction* and *timing* of copying.¹⁸² We would like to encourage competition against incumbents, protect entrants' ability to establish themselves in the marketplace, and prevent the gouging of down-market users whose technologies or businesses depend on a specific piece of software. In short, the older the product and the larger the creator is relative to the copier, the more copy protections are potentially problematic.

IP rights for interfaces are dangerous because they can create down-market lock-in, which hurts customers and blocks market entry.¹⁸³ But lock-in only becomes a major issue when a service is popular enough and old enough to have a large population of customers with critical dependencies on the service. When a copied product is not well-established, the need for interoperability and cheap substitutes is not as strong. The copying of smaller, newer interfaces does not protect the interoperability that concerned software IP commentators and policymakers, especially when the copier is well-established in the market or the creator is not.

In general, IP does not protect innovations discovered through market experimentation, which raises another challenge for copy protection in interfaces.¹⁸⁴ Some scholars argue that IP rights in insights derived through market experimentation are unnecessary because businesses will naturally pursue new opportunities, and those opportunities are disclosed by the public nature of the market.¹⁸⁵ But when market experiments are observable and expensive, there is a free-

182. Contrast concerns surrounding new entrants being pushed out by incumbent copiers—for example, Brian Casillas, Comment, *Attack of the Clones: Copyright Protection for Video Game Developers*, 33 LOY. L.A. ENT. L. REV. 137 (2014) (copying of video game mechanics); Khan, *supra* note 118, at 747 (copying and out-competing of successful small players by platforms)—with the discussion of the need for interoperability with incumbents recounted in Part II.

183. This was one of the concerns in *Lotus*. See *Lotus Dev. Corp. v. Borland Int'l, Inc.*, 49 F.3d 807, 821 (1st Cir. 1995) (Boudin, J., concurring).

184. See *supra* Section III.B.

185. See, e.g., Rochelle Cooper Dreyfuss, Essay, *Are Business Method Patents Bad for Business?*, 16 COMPUT. & HIGH TECH. L.J. 263, 274–77 (2000).

		Copier	
		New Entrant	Incumbent
Creator	New Entrant	“copying by peers” Mixed Copying between startups can accelerate innovation, but it can also risk drowning an innovative creator in a sea of copycats with lower ability to innovate.	“upward copying” Often Anticompetitive Innovations might reach a broader market more quickly, but entrants face steeper initial competition, which increases barriers to entry and reduces competition.¹⁸⁷
	Incumbent	“downward copying” Often Procompetitive Allows market entrants to produce substitutes but may reduce the reward from innovation by large companies.¹⁸⁸	“copying by peers” Mixed Traditional IP analysis applies.

Table 2. The Competitive Effect of “Directional” Copying.

riding problem that might prevent the experiments from occurring in the first place.¹⁸⁶

Software designs need more protection than they currently receive, but that protection needs sharp limits.¹⁸⁹ It should come into force quickly and cheaply enough to support disruptive innovation by fast-iterating, resource-constrained firms.¹⁹⁰ It should apply to hard-won insights

186. Abramowicz & Duffy, *supra* note 18, at 342. See also Michael Abramowicz, *Orphan Business Models: Toward a New Form of Intellectual Property*, 124 HARV. L. REV. 1362, 1366 (2011).

187. See Part III.

188. See Part II.

189. Proposals for new protection for designs have come up a number of times in history. See, e.g., Barbara A. Ringer, *The Case for Design Protection and the O’Mahoney Bill*, 7 BULL. COPYRIGHT SOC’Y U.S.A. 25, 25–27 (1959) (reviewing the history of design protection in industrialization and making arguments for protection and limitation that parallel the one in this Article). See also David Goldenberg, *The Long and Winding Road: A History of the Fight over Industrial Design Protection in the United States*, 45 J. COPYRIGHT SOC’Y U.S.A. 21, 22 (1997).

190. See Samuelson, Davis, Kapor & Reichman, *supra* note 17, at 2423.

derived through market experimentation, even when those insights fall short of traditional expressiveness or novelty requirements. It should be limited by competition and context, offering strong enough exclusive rights to empower new entrants, but not strong enough to entrench incumbents. It should last long enough to support entry and growth, but not so long that it suffocates downstream markets.

With these requirements in mind, this Section outlines one potential approach to IP-like protection for software design: an automatic, quasi-property right in software designs modeled after the common law misappropriation doctrine.¹⁹¹

2. THE MISAPPROPRIATION DOCTRINE AS A MODEL FOR IP REFORM

Misappropriation rules evolved in common law to address situations that fell outside the bounds of IP law but required a property-like right in intangibles to avoid a tragedy of the commons.¹⁹² Misappropriation as a form of unfair trade practice fell into two broad categories: the misappropriation of trade secrets and the general act of misappropriation, sometimes referred to as the “hot news” doctrine.¹⁹³ Trade secret misappropriation applies to information that an owner takes “reasonable measures” to keep secret and that “derives independent economic value . . . from not being generally known.”¹⁹⁴ General misappropriation applies to free-riding on another’s efforts in a way that causes competitive harm.¹⁹⁵

191. CONTU considered and rejected the misappropriation doctrine as underproductive, in part because it offers little protection against copying by noncompetitors. See CONTU REPORT, *supra* note 25, at 18. For this Article’s purposes, misappropriation law’s inability to restrict non-competitive copying is a feature, not a bug.

192. See Shyamkrishna Balganesh, “Hot News”: *The Enduring Myth of Property in News*, 111 COLUM. L. REV. 419, 461–62 (2011); Richard A. Epstein, *International News Service v. Associated Press: Custom and Law as Sources of Property Rights in News*, 78 VA. L. REV. 85, 114–16 (1992).

193. See Balganesh, *supra* note 192; RESTATEMENT OF THE LAW OF TORTS §§ 757–60 (AM. L. INST. 1939) (defining misappropriation of trade secrets and acquisition of information by improper means).

194. 18 U.S.C. §§ 1839(3)(A)–(B).

195. Note that misappropriation is not a general prohibition on free riding. Many kinds of copying accelerate economic growth by letting innovators build on each other’s discoveries. Instead, it addresses specific kinds of copying that reduce social welfare or violate public morals. For a discussion of these dynamics, see Michael E. Kenneally, *Misappropriation and the Morality of Free-Riding*, 18 STAN. TECH. L. REV. 289 (2015); Mark Lemley, *Property, Intellectual Property, and Free Riding*, 83 TEX. L. REV. 1031 (2005); Balganesh, *supra* note 192, at 441–43. For examples of productive copying, see GOVERNING KNOWLEDGE COMMONS (Brett M. Frischmann, Michael J. Madison & Katherine J. Strandburg eds., 2014); Shyamkrishna Balganesh, *The*

The misappropriation doctrine was created by the Supreme Court in the 1918 case *INS v. AP*.¹⁹⁶ Associated Press (AP) received updates from their overseas correspondents, which the International News Service (INS) copied and reported, depriving AP of any first-mover advantage for collecting the news.¹⁹⁷ The Supreme Court declared that AP had a “quasi property right” in breaking news and that INS violated that right through their copying.¹⁹⁸ The Court modeled the doctrine after nuisance law, which forbids the use of one’s property in a way that interferes with another’s.¹⁹⁹ Under this formulation, “hot news” could only protect AP to the extent that INS interfered with AP “reaping the fruits of [its] efforts and expenditure.”²⁰⁰ In effect, the decision only required INS to postpone publication long enough to give AP a chance to reach the market. Even with that limitation, the doctrine was controversial, especially its adoption into the first Restatement of Torts.²⁰¹ Still, many state courts

Normativity of Copying in Copyright Law, 62 DUKE L.J. 203 (2012). On limiting misappropriation law, see Joseph A. Tomain, *First Amendment, Fourth Estate, and Hot News: Misappropriation Is Not a Solution to the Journalism Crisis*, 2012 MICH. ST. L. REV. 769, 795–97; Richard A. Posner, Essay, *Misappropriation: A Dirge*, 40 Hous. L. REV. 621, 622–25 (2003).

196. *Int’l News Serv. v. Associated Press*, 248 U.S. 215, 240 (1918).

197. *Associated Press v. Int’l News Serv.*, 240 F. 983, 985 (S.D.N.Y. 1917), *modified*, 245 F. 244 (2d Cir. 1917), *aff’d*, 248 U.S. 215 (1918) (relaying the facts of the case). INS used information collected from AP bulletin boards and east-coast early editions to break news in tandem with west-coast AP member’s early editions. The trial court also established that both gathering and distributing the news involve great expense. *Id.* at 984.

198. *Int’l News Serv.*, 248 U.S. at 236.

199. *Id.* at 241 (referencing the principle of “sic utere tuo [ut alienum non laedas]”). See also Jutta Brunné, *Sic utere tuo ut alienum non laedas*, in MAX PLANCK ENCYCLOPEDIAS OF INTERNATIONAL LAW (Anne Peters & Rüdiger Wolfrum eds., 2022) (translating the Latin term “sic utere tuo ut alienum non laedas” to mean “use your own property in such a manner as to not injure that of another”).

200. *Int’l News Serv.*, 248 U.S. at 241.

201. Compare *id.* at 250 (Brandeis, J., dissenting), with *id.* at 248 (Holmes, J., dissenting) (both expressing doubts about common law misappropriation). When the doctrine was codified in the First Restatement of Torts, commentary and judicial reactions were fiery. See, e.g., Arthur L. Goodhart, *Restatement of the Law of Torts, Volume IV: A Comparison Between American and English Law*, 91 U. PA. L. REV. 487, 487 (1943) (characterizing the volume as “controversial,” noting the divergence with English law, and questioning whether the American Law Institute had stated a “doubtful rule[]”); Patrick J. Kelley, *The First Restatement of Torts: Reform by Descriptive Theory*, 32 S. ILL. U. L.J. 93, 131 (2007). A number of noted scholars and jurists have expressed sharply critical views of this body of common law doctrine. See, e.g., Posner, *supra* note 195. In his first misappropriation case, Judge Learned Hand offered an influential critique of the doctrine, explaining that new IP rights affect the balance of trade for an entire industry, and that judges are limited to information from the litigants before them and cannot appropriately balance the interests of many non-party actors. *Cheney Bros. v. Doris Silk Corp.*, 35 F.2d 279, 280 (2d Cir. 1929). Acknowledging that their *Cheney*

adopted misappropriation. While *Erie*²⁰² invalidated federal common law, including *INS*, states continued to develop and apply the misappropriation doctrine.²⁰³

Software interface cloning presents similar problems to the ones raised by *INS*. Should some things be protected from appropriation even if IP protection is explicitly unavailable? Does the identity of the copier or their relationship to the creator matter? How long should copy protection last? The *INS* Court acknowledges all these questions, and subsequent development by states coalesced into a vaguely consistent set of elements and evidentiary standards.²⁰⁴

Unlike IP law, the misappropriation doctrines consider the use—not the content—of protected data.²⁰⁵ Rather than encouraging innovation, misappropriation rules often deal with encouraging production, market entry, and growth.²⁰⁶ Software IP law was designed around competition

decision resulted in a “hiatus in completed justice,” Hand and the Second Circuit held that the creation of new rights exceeded the bounds of judicial discretion. *Id.* at 281.

202. *Erie R.R. Co. v. Tompkins*, 304 U.S. 64 (1938).

203. *Id.* at 79–80 (ending most federal common law). For examples of state misappropriation doctrine, see *supra* notes 204–06.

204. Though the specific elements vary, all states with a misappropriation doctrine include three elements: (1) work developed at substantial cost to the plaintiff; (2) appropriated by the defendant at a substantially reduced cost; and (3) some authorization or consent by the plaintiff. *See, e.g., U.S. Golf Ass’n v. Arroyo Software Corp.*, 69 Cal. App. 4th 607, 618 (1999). *Cf. hiQ Labs, Inc. v. LinkedIn Corp.*, No. 17-cv-03301, 2021 WL 1531172, at *8 (N.D. Cal. Apr. 19, 2021) (describing California’s broad reading of misappropriation doctrine and collecting cases). In some states the second factor also requires a commercial relationship between plaintiff and defendant—a requirement also endorsed in Nimmer’s treatise on copyright, 3 DAVID NIMMER, NIMMER ON COPYRIGHT § 16.01 (1990)—or use of the appropriated work to compete with the plaintiff. *See, e.g., GAI Audio of N.Y., Inc. v. Columbia Broad. Sys., Inc.*, 340 A.2d 736, 747 (1975); *Kienzle v. Cap. Cities/Am. Broad. Co.*, 774 F. Supp. 432, 436 n.8 (E.D. Mich. 1991); *Mercury Rec. Prods., Inc. v. Econ. Consultants, Inc.*, 218 N.W.2d 705, 709–10 (Wis. 1974). New York’s approach to this second element is inconsistent. *Compare Metro. Opera Ass’n v. Wagner-Nichols Recorder Corp.*, 101 N.Y.S.2d 483, 491–92 (App. Div. 1951) (“[T]he existence of actual competition between the parties is no longer a prerequisite.”), with *ITC Ltd. v. Punchgini, Inc.*, 880 N.E.2d 852, 859 (N.Y. 2007) (tracing inconsistent application of the competition requirement). Most state courts follow New York’s approach and treat their case law as persuasive. *See, e.g., Bd. of Trade of Chi. v. Dow Jones & Co.*, 456 N.E.2d 84, 89 (Ill. 1983); *Videotronics, Inc. v. Bend Elecs.*, 564 F. Supp. 1471, 1476 (D. Nev. 1983); *Vertex Servs., LLC v. Oceanwide Hous., Inc.*, 583 S.W.3d 841, 849 (Tex. App. 2019).

205. *See, e.g., Rochelle Cooper Dreyfuss, Do You Want To Know a Trade Secret? How Article 2B Will Make Licensing Trade Secrets Easier (but Innovation More Difficult)*, 87 CALIF. L. REV. 191 (1999) (noting that trade secret misappropriation’s focus on behavior instead of information violates the traditional IP “bargain” where creators disclose their innovation to the public in return for exclusive rights).

206. *See, e.g., Alcatel USA, Inc. v. DGI Techs., Inc.*, 166 F.3d 772, 788 (5th Cir. 1999) (“In contrast to federal copyright law, which focuses on the value of creativity,

and production; switching to a form of copy protection that focuses on market effects and competitive context has some intuitive appeal.

Using the most common elements from state standards as scaffolding, the following five-element test is one possible articulation of a misappropriation-based protection against software interface cloning.²⁰⁷

(1) *Plaintiff's development costs*²⁰⁸: The first factor establishes the development costs borne by the plaintiff, including the business risks and opportunity costs associated with development and market experimentation.

(2) *Defendant's cost avoidance*²⁰⁹: The second factor asks which costs the defendant avoided by leveraging the plaintiff's efforts. This may differ significantly from the first factor. For example, the goodwill, regulatory risks, and compliance requirements associated with product testing are far greater for a major digital platform than for a startup.

(3) *Competitive advantage*: The third factor asks whether the defendant's use of the plaintiff's efforts to gain a competitive advantage amounts to "reap[ing] where one has not sown."²¹⁰ The sum of the first two factors may not completely capture the competitive effect of copying. This factor considers the extent to which the defendant leveraged an opportunity that was created through the other's efforts.

(4) *Competitive injury*²¹¹: The fourth factor asks if the defendant's use of the plaintiff's effort prevented the plaintiff from attempting to

state misappropriation law is specifically designed to protect the *labor*—the so-called 'sweat equity'—that goes into creating a work.”).

207. See Edmund J. Sease, *Misappropriation Is Seventy-Five Years Old: Should We Bury It or Revive It*, 70 N.D. L. REV. 781, 784 (1994) (listing the combined elements of misappropriation as “(1) Plaintiff has created its asset through considerable expenditure of time, labor, and skill; (2) Defendant has appropriated plaintiff's asset without expenditure of time, labor, and skill to frustrate plaintiff's primary purpose in creation of the asset; (3) Defendant has competed with plaintiff; (4) Defendant's appropriation has caused commercial damage to plaintiff; (5) Relief is not available to plaintiff through other traditionally recognized unfair competition doctrines; and (6) There is no federal preemption”).

208. The first element of almost every state misappropriation doctrine requires “time, labor [or effort], and money expended in the creation of the thing appropriated.” See, e.g., *Alaskaland.com, LLC v. Cross*, 357 P.3d 805, 810 (Alaska 2015); *GAI Audio of N.Y., Inc. v. Columbia Broad. Sys., Inc.*, 340 A.2d 736, 747 (Md. Ct. Spec. App. 1975); *Videotronics, Inc. v. Bend Elecs.*, 564 F. Supp. 1471, 1476 (D. Nev. 1983); *Vertex Servs., LLC v. Oceanwide Hous., Inc.*, 583 S.W.3d 841, 849 (Tex. App. 2019).

209. A handful of states require showing that the “defendant appropriated the ‘thing’ at little or no cost.” See, e.g., *Videotronics*, 564 F. Supp. at 1476. However, a majority focus instead on the competitive advantage, which I capture in the next element.

210. *Int'l News Serv. v. Associated Press*, 248 U.S. 215, 239 (1918).

211. Competitive injury or commercial harm is a factor in every articulation of state misappropriation law. See, e.g., *Vertex Servs.*, 583 S.W.3d at 849; *Mercury Rec. Prods., Inc. v. Econ. Consultants, Inc.*, 218 N.W.2d 705, 709–10 (Wis. 1974). The

capitalize on a commercial opportunity. When considering whether the plaintiff was actually precluded from the opportunity, relevant factors include (a) whether the parties' relative capacities—such as repurposable technologies, preexisting networks, and vertical integrations—would allow the defendant to “steal” the opportunity, and (b) the cost advantage from the sum of the first three elements.²¹² For example, if the defendant had preexisting distribution capabilities and the plaintiff did not, this factor would view copying before the plaintiff had a chance to scale as a loss of opportunity. By contrast, if a plaintiff had focused on another market first, already had an established market presence, or had a capacity advantage over the defendant, they would have a weaker claim.

(5) *Public interest*²¹³: A final factor lets decisionmakers consider whether there is a public interest in discouraging the kind of copying in question. The analysis balances two priorities: (a) whether allowing the kind of copying in question might reduce the incentives for innovation and entrepreneurship, and (b) whether forbidding the kind of copying in question might reduce consumer welfare, either by delaying or denying consumer access to useful innovation, or by increasing costs.²¹⁴

exact definition of competitive injury varies across jurisdictions. In his treatise on copyright law, Nimmer asserted that misappropriation claims were preempted by the Copyright Act unless there was a “contract implied-in-fact, a quasi-contract, or a fiduciary relationship.” 3 NIMMER, *supra* note 204, § 16.01. *See, e.g., Kienzle v. Cap. Cities/Am. Broad. Co.*, 774 F. Supp. 432, 436 n.8 (E.D. Mich. 1991) (quoting 3 NIMMER, *supra* note 204, § 16.01).

212. This Article's approach draws from the New York approach. In misappropriation cases, the New York Court of Appeals characterizes competitive injury cases in terms of lost opportunity. *See, e.g., E.J. Brooks Co. v. Cambridge Sec. Seals*, 105 N.E.3d 301, 449 (N.Y. 2018) (“The essence of the misappropriation theory is not just that the defendant has ‘reap[ed] where it has not sown,’ but that it has . . . unfairly neutralized a commercial advantage that the plaintiff achieved through ‘honest labor.’” (quoting *Int'l News Serv.*, 248 U.S. at 236, 239–40). *See also ITC Ltd. v. Punchgini, Inc.*, 880 N.E.2d 852, 859 (2007) (“[A]n unfair competition claim involving misappropriation usually concerns the taking and use of the plaintiff's property to compete against the plaintiff's own use of the same property.” The term ‘commercial advantage’ has been used interchangeably with ‘property’ within the meaning of the misappropriation theory.” (citations omitted) (quoting *Roy Exp. Co. v. Columbia Broad. Sys., Inc.*, 672 F.2d 1095, 1105 (2d Cir. 1982)).

213. While public interest considerations likely influence every court to some degree, the Illinois Supreme Court explicitly included this factor when considering a misappropriation case. *See Bd. of Trade of Chi. v. Dow Jones & Co., Inc.*, 456 N.E.2d 84, 90 (Ill. 1983).

214. *Id.* at 89 (“Competing with the policy that protection should be afforded one who expends labor and money to develop products is the concept that freedom to imitate and duplicate is vital to our free market economy. . . . If the creator of an intangible product expects to be able to control the licensing or distribution of the intangible in order to profit from his effort, and similarly those who would purchase the product expect and are willing to pay for the use of the intangible, a better argument can be made in favor of granting protection.”).

This approach makes strides toward meeting the requirements outlined in the previous Section. Protection applies immediately and automatically, meaning it is available to smaller and fast-moving companies. And the term and scope of protection are limited to situations that implicate competition. The misappropriation approach would still allow the kind of copying at issue in *Lotus*, *Altai*, and *Oracle*, as those cases all involved well-established interfaces that held dominant market positions for years; it would be hard to argue in any of those cases that a plaintiff was barred from a market.²¹⁵

3. IMPLEMENTATION

There are several ways this policy approach could be implemented as an enforcement scheme. Three are considered here: through continued development in the courts, through congressional amendment to the Copyright Act, and through Federal Trade Commission (FTC) enforcement.

a. Existing Misappropriation Law

Federal IP laws preempt state misappropriation laws when they overlap. Identifying the precise boundaries of that overlap is complicated. Still, depending on the circuit, some state misappropriation doctrines—including those in Texas, California, and New York—remain good law.²¹⁶

Federal preemption of general misappropriation and of trade secret misappropriation diverged over the course of the twentieth century. Trade secret misappropriation largely dodged preemption challenges. In *Kewanee v. Bicron*,²¹⁷ the Supreme Court held that federal IP law does not preempt state trade secret laws,²¹⁸ setting off the development of robust²¹⁹ trade secret rules and eventually leading to the codification of

215. It is hard to argue that companies selling market-leading software for years were denied the opportunity to sell that software to that market. *Oracle* is a harder case, but the Java API is so old and entrenched that *Oracle* would face an uphill battle showing competitive harm, and downstream reliance would push strongly in favor of a public interest in allowing that copying.

216. *Alcatel USA, Inc. v. DGI Techs., Inc.*, 166 F.3d 772, 788 (5th Cir. 1999) (“In contrast to federal copyright law, which focuses on the value of creativity, state misappropriation law is specifically designed to protect the *labor*—the so-called ‘sweat equity’—that goes into creating a work. This purpose is evident in the elements of proof required to succeed under a Texas misappropriation claim.” (footnote omitted)).

217. *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470 (1974).

218. *Id.* at 474.

219. Many argue *too* robust. See, e.g., Christopher J. Morten, *Publicizing Corporate Secrets*, 171 U. PA. L. REV. 1319, 1327–29 (2023).

trade secret protection as federal law in 2016.²²⁰ General misappropriation had a harder time in the courts. In *Sears*²²¹ and *Compco*,²²² twin cases decided on the same day in 1964, the Supreme Court found misappropriation largely preempted by federal IP law.²²³ In both cases, the defendant sold products with industrial designs almost indistinguishable from the plaintiffs'.²²⁴ District courts found the patents for those designs invalid, but nevertheless held for the plaintiffs because the copying constituted unfair competition and created potential consumer confusion.²²⁵ The Supreme Court unanimously rejected the use of state law to create IP-like protections explicitly rejected by federal IP law.²²⁶ The Court explained that federal IP laws protect both inventors and the free exercise of knowledge; allowing invalidated patents to fall back on state protections would alter the balance struck by Congress.²²⁷ In 1989, the Supreme Court revisited the preemption question in *Bonito Boats*,²²⁸ a case involving a Florida statute prohibiting “plugging”—copying boat hulls by taking a mold.²²⁹ While plaintiffs in the case made no attempt to leverage federal IP protection, the Court still found Florida’s misappropriation-like statute preempted by the Patent Act.²³⁰

The Second Circuit was the first to explicitly clarify the limits of misappropriation doctrine after *Bonito Boats*, reframing New York’s common law misappropriation rule to focus on competitive conduct instead of information protection. The Second Circuit’s approach was persuasive in other circuits’ preemption analyses, but the boundaries of federal preemption vary with the specific state rule in question and the

220. See UNIF. TRADE SECRETS ACT (NAT’L CONF. OF COMM’RS ON UNIF. STATE L. 1986); Defend Trade Secrets Act of 2016, 18 U.S.C. § 1836.

221. *Sears, Roebuck & Co. v. Stiffel Co.*, 376 U.S. 225 (1964).

222. *Compco Corp. v. Day-Brite Lighting, Inc.*, 376 U.S. 234 (1964).

223. *Sears*, 376 U.S. at 231–32; *Compco*, 376 U.S. at 237–38.

224. *Sears*, 376 U.S. at 226; *Compco*, 376 U.S. at 235.

225. *Sears*, 376 U.S. at 226; *Compco*, 376 U.S. at 235.

226. *Sears*, 376 U.S. at 231–32; *Compco*, 376 U.S. at 237. The underlying case in *Sears* is odd in that the arguments and preempted state unfair competition law include a good amount of discussion about consumer confusion from an “identical” product, yet the Court’s decision only analyzes patent trademark. I am unable to find any papers discussing that oddity (there must be some!), but it seems to add a bit of a wrinkle in the preemption analysis. This is worth raising because the Court makes the apparent 180 in *Kewanee*. See *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470 (1974).

227. *Compco*, 376 U.S. at 237.

228. *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141 (1989).

229. *Id.* at 163.

230. *Id.* at 144.

relevant circuit's interpretation of federal IP law protection's negative space.²³¹

A few test cases could revitalize the misappropriation doctrine in the software space. The Second Circuit has upheld the use of the doctrine in two major cases involving the publication of data.²³² A few courts have mentioned misappropriation favorably in dicta of data scraping cases.²³³ And, congressional history supports a reading of the Copyright Act that does not preempt misappropriation. The House Report on the Copyright Act of 1976 contains colloquies clarifying that the act's preemption clause should not unseat the "hot news" doctrine and contemplates the doctrine's expansion in the digital age.²³⁴ *Bonito Boats* was congressionally overruled by the Vessel Hull Design Protection Act.²³⁵

231. While many district courts layer the Second Circuit's test on top of state law to determine preemption, the Seventh Circuit is the only federal appellate court to have seemingly adopted the Second Circuit's test wholesale. *See ConFold Pac., Inc. v. Polaris Indus., Inc.*, 433 F.3d 952, 960 (7th Cir. 2006). Three other circuits have ruled on preemption: The Ninth Circuit reads federal preemption as more limited, permitting a broad application of misappropriation doctrine by California courts. *See U.S. Golf Ass'n v. Arroyo Software Corp.*, 81 Cal. Rptr. 2d 708, 715 (Ct. App. 1999). *See also hiQ Labs, Inc. v. LinkedIn Corp.*, No. 17-cv-03301, 2021 WL 1531172, at *6–8 (N.D. Cal. Apr. 19, 2021) (describing California's broad reading of misappropriation doctrine and collecting cases). The Fifth Circuit has heard a number of Texas cases, found each case preempted by federal law, but explicitly limited each holding to the facts. *Alcatel* is representative: *Alcatel USA, Inc. v. DGI Techs., Inc.*, 166 F.3d 772, 788–89 (5th Cir. 1999) (noting that federal and state law do not always overlap because federal copyright law protects creativity and state misappropriation law protects "sweat equity" but finding the immediate claims preempted). And, the Sixth Circuit requires an "extra element, such as a confidential or fiduciary relationship." *Stromback v. New Line Cinema*, 384 F.3d 283, 302 (6th Cir. 2004).

232. *Nat'l Basketball Ass'n v. Motorola, Inc.*, 105 F.3d 841, 848 (2d Cir. 1997); *Barclays Cap. Inc. v. Theflyonthewall.com, Inc.*, 650 F.3d 876, 878 (2d Cir. 2011).

233. *See, e.g., hiQ Labs*, 2021 WL 1531172, at *6–8 (describing California's broad reading of misappropriation doctrine and collecting cases).

234. S. REP. NO. 94-473, at 116 (1975) ("'Misappropriation' is not necessarily synonymous with copyright . . . [and] is not preempted if it is in fact based neither on a right within the general scope of copyright . . . nor on a right equivalent thereto. For example, state law should have the flexibility to afford a remedy . . . against a consistent pattern of unauthorized appropriation by a competitor . . . whether in the traditional mold of [INS], or in [new forms involving computers]."). This rule is often reaffirmed when the Copyright Act is updated. *See, e.g.,* Visual Artists Rights Act of 1990, 1990 U.S.C.C.A.N. 6915, 6931 ("State law causes of action such as those for misappropriation . . . are not currently preempted under section 301, and they will not be under the proposed law.").

235. *Compare* FLA. STAT. ANN. § 559.94 (1987) (repealed 1991) ("Duplication of vessel parts"), *with* Vessel Hull Design Protection Act, Pub. L. No. 105-304, 112 Stat. 2905 (1998) (codified as amended at 17 U.S.C. § 1301(b)) (copying definitions verbatim from the Florida statute).

There are some practical issues with this approach. Applying heterogeneous state law to country-spanning markets like the internet leads to venue shopping and creates hard-to-navigate patchworks of inconsistent laws.²³⁶ Jurists may also not be the best-positioned policymakers to adjust trade rules in emerging markets. IP rights affect the balance of trade for an entire industry, while judges are limited to information from the litigants in a case, leaving them insufficiently informed to appropriately balance the interests of many non-party market participants.²³⁷ Even if some doctrinal clarity emerged, any IP rules enforced through a private right of action are limited by access to the courts. Startups cannot afford the cost, delay, and distraction of building a patent portfolio. They probably cannot afford the cost, delay, and distraction of suing their competitors either. Even if startups could win cases and collect meaningful loss-of-opportunity damages, they will not create new competitive threats if they go out of business over the course of litigation. Thus, private rights of action would likely be under protective in the case of upward copying. At the same time, the broader range of covered subject matter might create more opportunities for firms to bring misappropriation suits. A revitalization of the misappropriation tort might give well-heeled firms more opportunities to use the threat of litigation as a competitive cudgel, resulting in over-protection against upward copying.

b. New Federal Protection

Several legislative interventions could implement the approach proposed here. Congress could amend the Copyright Act, establish misappropriation-like rules for online software, or clarify the language of Section 301 to limit the preemption of state misappropriation laws.

Sector-specific amendments to the Copyright Act following technological changes that upset cost structures have a long history.²³⁸

236. Cf. Jeff Kosseff, *Hacking Cybersecurity Law*, 2020 U. ILL. L. REV. 811, 837 (contrasting state cybersecurity laws with federal patent law).

237. Judge Hand made this observation in his first misappropriation case. See *Cheney Bros. v. Doris Silk Corp.*, 35 F.2d 279, 281 (2d Cir. 1929). Hand appears to be building on arguments from Brandeis's dissent in *INS*. See *Int'l News Serv. v. Associated Press*, 248 U.S. 215, 267 (1918) (Brandeis, J., dissenting).

238. Here is a selection of copyright reform in response to changes in production or copying costs:

Change to Cost of Copying	Amendment to Copyright
[1851] New technology makes photographs reproduceable. See <i>Frederick Scott Archer</i> , INT'L PHOTOGRAPHY HALL FAME, https://iphf.org/inductees/frederick-scott-archer/ [https://perma.cc/XMN4-98QF].	[1865] Copyright amendments add protection for photographs. Ch. 125, 13 Stat. 540 (1865).

Five familiar motivating factors feature in the legislative history surrounding each of these amendments: (1) development is costly; (2) competitors can quickly and easily duplicate the final product; (3) that duplication undermines the original developer's ability to recoup their cost of development; (4) harmless copying by consumers is either unlikely or protected by fair use; and (5) there is a public benefit to the kind of innovation in question.²³⁹

Passing misappropriation-like IP reforms is at least plausible. More recently, the Defend Trade Secrets Act codified trade secret

[1960s] High fidelity re-recording technologies commercially available.	[1971] Sound Recording Act protects sound recordings. Pub. L. No. 92-140, 85 Stat. 391 (1971).
[1970s] General-purpose computer programs commercially viable independent of hardware.	[1981] Computer Software Copyright Act adds copyright protection for computer programs. Pub. L. No. 96-517, 94 Stat. 3015 (1980).
[1980s] Computer chips cost millions to design but could be essentially photocopies.	[1984] Semiconductor Chip Protection Act prohibits copying chip designs. Pub. L. No. 98-620, 98 Stat. 3347 (1984).
[1989] After <i>Bonito Boats</i> invalidates state laws against “plugging” boat hulls, the practice becomes increasingly popular. <i>See Vessel Hull Design Protection Act: Hearing on H.R. 2696 Before the Subcomm. on Cts. & Intell. Prop.</i> , 105th Cong. 28–30 (1997) (describing how boat hulls can cost hundreds of thousands of dollars and years to design, but “plugging” creates a reproduceable copy for a few thousand dollars and an evening of work).	[1998] Vessel Hull Design Protection Act reimplements the Florida state law preempted in <i>Bonito Boats</i> . Pub. L. No. 105-304, 112 Stat. 2905 (1998).
[1990s] Personal computers and the internet make copying and distributing content effectively free.	[1998] Digital Millennium Copyright Act prevent circumvention of digital copy protection technologies. Pub. L. No. 105-304, 112 Stat. 2860 (1998).
[2010s] Digital streaming services effectively replace private ownership of recordings.	[2018] Orrin G. Hatch-Bob Goodlatte Music Modernization Act adjusts royalty rules for music streaming. Pub. L. No. 115-264, 132 Stat. 3676 (2018).

See also CONTU REPORT, *supra* note 25, at 65–66 (providing a similar list).

239. For instances of legislators invoking all these factors over the course of a colloquy, see, for example, 144 CONG. REC. S10657 (Sept. 21, 1998) (statement of Sen. John Breaux) (boat hulls); Computer Software Copyright Act of 1980, H.R. 6934, 96th Cong. (1980); Semiconductor Chip Protection Act of 1984, H.R. 5525, 98th Cong. (1984).

misappropriation doctrine into federal law.²⁴⁰ Though general misappropriation's history is more checkered, public concerns around tech and AI might provide a political tailwind for copyright reform that was not there in the 1990s. "Taking on big tech" is a bipartisan priority, and IP reform is foundational to many regulatory attempts to address concentration in digital platform markets.²⁴¹

While a federal amendment to the Copyright Act would address some of the issues with existing state law, it is still limited by small plaintiffs' willingness to bring suit. A small actor that sues an incumbent copier might remove the incumbent only to find themselves at a competitive disadvantage to similar-sized peers that avoided the distraction and resource drain of a lawsuit. When other industries face a volunteer's dilemma in bringing socially beneficial suits, Congress occasionally sets up rewards for successful litigants. For example, the Hatch-Waxman Act Amendments reward generic drug manufacturers that bring a successful patent challenge with a short-term patent-like right in the challenged drug.²⁴² Congress could grant a similar short-term design patent to companies that successfully defend themselves against misappropriation.

While the problems with software cloning differ from those raised in patent-first industries, the general concept makes sense. Well-calibrated rewards for procompetitive suits could drive market-correcting litigation. For example, using a defendant's reported goodwill as a basis for damage computation would encourage litigants to target larger incumbents and render smaller companies effectively litigation-proof.²⁴³ The risk of huge damages could reduce incumbents' cloning incentives, potentially even leading to a market for interface design licenses. And licenses could provide a sustainable alternative to acquisitions.²⁴⁴ Licenses and copy protection could also encourage disruptive innovation

240. Defend Trade Secrets Act of 2016, 18 U.S.C. § 1836.

241. See Graham & Warren, *supra* note 114.

242. Drug Price Competition and Patent Term Restoration Act of 1984, Pub. L. No. 98-417, 98 Stat. 1585 (codified at 21 U.S.C. § 301).

243. Google, Facebook, and Amazon all estimate their brand's goodwill to be between \$20 billion and \$30 billion. Alphabet Inc., Annual Report 47 (Form 10-K) (2022); Meta Platforms, Inc., Annual Report 85 (Form 10-K) (2022); Amazon.com, Inc., Annual Report 39 (Form 10-K) (2022).

244. See Joshua S. Gans & Scott Stern, *Incumbency and R&D Incentives: Licensing the Gale of Creative Destruction*, 9 J. ECON. & MGMT. STRATEGY 485, 502 (2000) (suggesting that under certain conditions, licensing markets can promote innovation-boosting collaboration between startups and incumbents). *But see* Robin Feldman & Mark A. Lemley, *Do Patent Licensing Demands Mean Innovation?*, 101 IOWA L. REV. 137 (2015) (finding that, in practice, patent licensors often extract rents without transferring knowledge).

and growth by mid-sized companies that are too large for acquisition but too small to fight “big tech” on equal terms.

c. Agency Enforcement

Copying is typically viewed as procompetitive by the agencies—after all, copying means more competitors and therefore more competition. The FTC could use the misappropriation doctrine to identify instances of “bad” copying that constitute unfair trade practices.²⁴⁵ The misappropriation doctrine was originally framed as a prohibition against a kind of specific unfair trade practice.²⁴⁶ The doctrine provides a framework for identifying the exceptional cases of anticompetitive copying that benefits from over a century of refinement in the courts.

Section 5(a) of the FTC Act authorizes the FTC to proscribe “unfair methods of competition . . . and unfair or deceptive acts.”²⁴⁷ The agency is given wide latitude in defining “unfair,”²⁴⁸ and has recently announced a policy of using its Section 5 authority more aggressively.²⁴⁹ The FTC could adopt the misappropriation doctrine as a theory of harm in Section 5 enforcement actions. While the agency does not need to provide a detailed *ex ante* warning of which practices it considers unfair, Section 6 of the act also provides a mechanism through which to declare

245. As part of a workshop on journalism in 2009, the FTC investigated several forms of federal adoption of misappropriation doctrine. See FTC, POTENTIAL POLICY RECOMMENDATIONS TO SUPPORT THE REINVENTION OF JOURNALISM 8–10 (2010), https://www.ftc.gov/sites/default/files/documents/public_events/how-will-journalism-survive-internet-age/new-staff-discussion.pdf [<https://perma.cc/SL6Q-CM9Z>]. The draft is summarized in Jeffrey L. Harrison & Robyn Shelton, *Deconstructing and Reconstructing Hot News: Toward a Functional Approach*, 34 CARDOZO L. REV. 1649, 1671–84 (2013). These studies never moved beyond their use as a discussion prompt. *FTC Corrects Misinformation on Journalism Workshops and “Discussion Draft”: Ideas Are Compilation, Not Recommendations from Agency*, FTC (June 4, 2010), <https://www.ftc.gov/news-events/news/press-releases/2010/06/ftc-corrects-misinformation-journalism-workshops-discussion-draft-ideas-are-Compilation-not> [<https://perma.cc/39AE-EM63>].

246. See *supra* Section IV.A.2.

247. Federal Trade Commission Act, 15 U.S.C. § 45(a).

248. See Gilbert Holland Montague, *Unfair Methods of Competition*, 25 YALE L.J. 20 (1915) (summarizing the commentary of every congressperson who expressed a view on the meaning of “unfair methods of competition,” the sum of which seem to suggest the term is left intentionally vague in order to empower the FTC).

249. FTC, No. P221202, POLICY STATEMENT REGARDING THE SCOPE OF UNFAIR METHODS OF COMPETITION UNDER SECTION 5 OF THE FEDERAL TRADE COMMISSION ACT (2022), https://www.ftc.gov/system/files/ftc_gov/pdf/P221202Section5PolicyStatement.pdf [<https://perma.cc/S662-FJE3>].

certain acts unfair and therefore unlawful.²⁵⁰ Under Section 6, the FTC could even codify a federal misappropriation standard. The FTC has access to experts that could help identify problematic copying. It has the discretion and resource limitations to avoid rampant overenforcement or the creation of IP thickets.

Design misappropriation also synergizes with the FTC's more aggressive posture toward merger review. By preventing quick cloning by incumbents, misappropriation helps give smaller services a chance to establish a niche and mid-sized services the potential to grow into competitive threats. Especially in cases where the agency blocks acquisitions, providing some competitive protection for the startup whose employees and investors just endured the organizational trauma of a failed acquisition aligns with the goal of encouraging competitive growth.

The misappropriation doctrine's long doctrinal history might fare better in the courts than some of the more novel legal theories competition authorities have brought in cases involving digital platforms. Many of the measures used in traditional antitrust and competition law look for price effects and market share. When challenging companies with products priced at zero and acquisitions of companies with negligible market share, competition authorities are forced to advance new theories of competitive harm while distinguishing their tech cases from precedents that favor low prices and stable market concentration.²⁵¹ By using the elements and evidentiary standards from misappropriation, advocates would not need to sell (small-c) conservative judges on new theories of competitive harm. Cases brought under Section 5 also benefit from less stringent evidentiary requirements.²⁵²

250. Federal Trade Commission Act, 15 U.S.C. § 46(g). See Rohit Chopra & Lina M. Khan, *The Case for "Unfair Methods of Competition" Rulemaking*, 87 U. CHI. L. REV. 357, 358 (2020).

251. See Newman, *supra* note 136, at 162–63.

252. Section 5 challenges only need to show that the FTC considers the practice at issue “unfair,” while merger or monopolization charges require the FTC to defend a market definition and demonstrate anticompetitive harms or potential harms. Compare, e.g., *FTC v. Wyndham Worldwide Corp.*, 799 F.3d 236, 256 (3d Cir. 2015) (holding that the FTC does not need to provide explicit ex ante guidance on what behavior it deems unfair “as long as [a] company can reasonably foresee that a court could construe its conduct as falling within the meaning of [Section 5]”), with *FTC v. Facebook, Inc.*, 560 F. Supp. 3d 1, 14–17 (D.D.C. 2021) (rejecting the FTC’s market definition of “personal social networking” services).

B. Removing Redundant Protection of Software Implementations

Tuning IP rules for online services requires both adding protection where it is needed and removing protection where it is not.²⁵³ Adding new IP rights, as the previous Section proposes, increases the risk of overprotection. This Section identifies the specific areas of software IP that are redundant, have inverted effects in the online context, or clash with the misappropriation protections proposed above.

1. THE CASE FOR ROLLING BACK TRADITIONAL IP PROTECTIONS ONLINE

Rolling back software IP protection is not a controversial stance. Anticommons problems abound under today's late, overlong protections. Commentators and policymakers note that the tech industry is rife with IP thickets, trolls, and aggregator shakedowns.²⁵⁴

Patent rights are especially insidious in emerging tech markets. If market forces or technical constraints push multiple actors to the same implementation, patents can block those non-copied duplicates from entering the market.²⁵⁵ Perhaps most damning is the relationship inventors have with software IP. Software engineers find patents for online services so distasteful that tech companies competing to attract engineers will offer employment agreements that prevent the company from asserting its assigned patents.²⁵⁶ Some groups of software engineers have organized efforts to subvert patent applications by publishing huge databases of prior art.²⁵⁷

253. See *supra* notes 126–33 and accompanying text.

254. See, e.g., JAMES BESSEN & MICHAEL J. MEURER, *PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK* 2–5, 17 (2008); Justin R. Orr, Comment, *Patent Aggregation: Models, Harms, and the Limited Role of Antitrust*, 28 BERKELEY TECH. L.J. 525, 529–32 (2013).

255. See *supra* Part III (discussing grant of software patents by the PTO).

256. See, e.g., Twitter, Inc., Registration Statement (Form S-1) (Oct. 3, 2013); Adam Messinger, *Introducing the Innovator's Patent Agreement*, X: BLOG (Apr. 17, 2012), https://blog.twitter.com/official/en_us/a/2012/introducing-the-innovator-s-patent-agreement.html [<https://perma.cc/9AWF-AQHR>].

257. For an example of a “no offensive use” contract, see Twitter, Inc., *supra* note 256, at 33–34 (describing the “Innovator's Patent Agreement,” which limits Twitter's ability to assert patents made by their employees or consultants). For examples of attempts by software engineers to subvert the patent system, see Alexander Reben, *About All Prior Art*, ALL PRIOR ART, <https://allpriorart.com/about/> [<https://perma.cc/K7EV-HCTT>], and Joel Spolsky, *Victory Lap for Ask Patents*, JOEL ON SOFTWARE (July 22, 2013), <https://www.joelonsoftware.com/2013/07/22/victory-lap-for-ask-patents/> [<https://perma.cc/7NF8-WWCH>].

a. Software Implementation Needs Less Protection

Software implementations in online services receive far too much IP protection. As Section III.A shows, natural copy protections and innovation incentives largely obviate the need for IP rights. Yet implementing code receives overlapping protection from multiple forms of IP. Even if software IP is appropriately tuned for installable programs, the introduction of trade secrecy and the inaccessible nature of online implementations leave online services more protected than their installable counterparts.

b. Software Interfaces Need Different Protection

Overlapping IP rules could expand the scope of protection beyond the limits set by the misappropriation doctrine. Design patents, and potentially copyrights, apply to some software designs. Since that protection would be concurrent with the misappropriation rule proposed here, they might extend IP rights in interfaces far beyond the misappropriation rule's term of protection.²⁵⁸ Meanwhile, misappropriation-based protection extends beyond the limits of traditional IP. Since misappropriation is conduct based, the subject-matter restrictions on patents and copyright are less applicable. As the *Sears*, *Compco*, and *Bonito Boats* Courts all noted, misappropriation-style rules can extend protection to discoveries that patent law and copyright law deliberately leave in the public commons.²⁵⁹

There are several reasons to prefer short, automatic, externally enforced copy regulation over traditional IP in markets with high growth and fast innovation cycles like online software. First, fast cycles increase the welfare cost of overlong terms of protection since each year deprives the public of more rounds of innovation and competition.²⁶⁰ Reasonable minds can disagree about the appropriate term of protection for online software, but traditional, decades-long terms are facially nonsensical for online platforms: at time of writing, Facebook is younger than a patent

258. The fifteen-year design patent term and ninety-five-year copyright term all almost certainly exceed the time it would take for even the smallest startup to take a shot at the tech market. Meta, for example, is only twenty years old and is the seventh largest public company in the world by market value. Andrea Murphy & Hank Tucker, *The Global 2000*, FORBES (June 8, 2023, 6:30 AM), <https://www.forbes.com/lists/global2000/> [https://perma.cc/CTC5-AQME].

259. *Sears, Roebuck & Co. v. Stiffel Co.*, 376 U.S. 225, 231–32 (1964); *Compco Corp. v. Day-Brite Lighting, Inc.*, 376 U.S. 234, 237 (1964); *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 156–57 (1989).

260. See *supra* Section II.C.2.

term.²⁶¹ Second, faster market cycles increase the cost of administrative delay and too-long terms of protection.²⁶² Patent law is especially inappropriate for fast-iteration markets; the median delay of patent review exceeds the average startup lifespan, far too slow to be relevant.²⁶³ Finally, high growth and fast market cycles make legal remedies less attractive because the opportunity cost of litigation is more likely to outweigh a chance at future payouts.²⁶⁴

2. IMPLEMENTATION: ADJUSTING SUBJECT MATTER RESTRICTIONS

Removing redundant and unnecessary protections in online software could be accomplished by ensuring that online software lies outside the subject matter protected by patent and copyright. Despite heavy use of software IP in practice, these subject-matter restrictions may already be consistent with existing law.

By cutting the scope of software copyright to the quick, space can be created for better-tuned protections. While this Article argues that interfaces need some property-like protection, copyright is a poor tool for the job. Copyright's term of protection is far, far too long,²⁶⁵ while

261. Facebook was founded in 2004. Mythili Devarakonda, *'The Social Network': When Was Facebook Created? How Long Did It Take To Create Facebook?*, USA TODAY (July 25, 2022, 12:00 PM), <https://www.usatoday.com/story/tech/2022/07/25/when-was-facebook-created/10040883002/> [https://perma.cc/4HC4-YBVV]. Patent terms are twenty years. 35 U.S.C. § 154(a)(2).

262. For example, if an innovation cycle takes a few weeks, then a several-year delay for a patent puts an inventor a generation behind. If innovation cycles take decades, then a few years does not seem so significant. *But see* Sarah Burstein, *Costly Designs*, 77 OHIO ST. L.J. 107 (2015) (arguing that high costs for design patents increase social welfare by discouraging less valuable patent applications).

263. Cf. Alexander Raskovich, Douglas H. Ginsburg, Bruce H. Kobayashi, Abbott B. Lipsky & John M. Yun, *IP Rights Delayed Are IP Rights Denied: The Global Antitrust Institute's Comment on the European Commission's 2023 Proposal To Regulate Standard-Essential Patents* (Geo. Mason Univ. L. & Econ. Rsch. Series, No. 23-12, 2023); Rowley, *supra* note 107 (median time between funding rounds is twenty-four months); USPTO ANNUAL REPORT, *supra* note 107 (reporting a 26.6-month average pendency for patents in the "Computer architecture, Software, and Information Security" category and a 25.2-month average pendency overall).

264. A more economics-y take on same intuition could view growth and innovation rates as determining the effective discount rate. If each market cycle or innovation cycle makes a firm proportionally bigger and more efficient, that essentially sets an industry-specific interest rate and depresses the future value of money. The faster the cycles, the less we would expect to see companies prioritizing the far-off rewards of patents or litigation over immediate growth.

265. *See supra* Section II.B (discussing the importance of interface copying to support interoperability and the production of substitutes).

its fair use exceptions are far too permissive to protect interfaces from upward copying.²⁶⁶

Courts seem to be slowly moving in the direction of tighter subject-matter restrictions in patent cases. Following *Bilski*²⁶⁷ and *Alice*, software patents face a much harder time passing the subject matter bar and are overturned more frequently.²⁶⁸ Still, patents and copyright protection for software continue to function in practice.²⁶⁹

Legislative adjustment to Section 101 of the Copyright and Patent Acts to largely exclude software and algorithms makes practical and political sense. From a practical perspective, eliminating software patents would cut the number of applications submitted to the overtaxed PTO in half, increasing patent quality and decreasing administrative burdens. Removing software-specific subject matter precedents would simplify a complicated and ambiguous corner of IP doctrine. From a political perspective, now is a good time for legislative change. Congress has shown an appetite for tech regulation, and concerns surrounding AI provide a strong political tailwind for tech IP reform.

* * *

This Part makes a case for replacing copyright and patent protection of online software with a set of market-based rules. Redesigning the IP regime around online services would deny IP rights where they are currently offered and offer IP rights where they are emphatically denied.

It offers a possible two-prong approach to operationalizing this change. The first prong would introduce a quasi-IP right modeled after the common law misappropriation doctrine, for which a few possible implementations are sketched. The second prong would legislatively short circuit the doctrinal trend towards excluding most aspects of

266. See *Google LLC v. Oracle Am., Inc.*, 141 S. Ct. 1183, 1209 (2021) (holding—in a case involving copying by a direct competitor—that copying of an API was a transformative fair use as a matter of law).

267. *Bilski v. Kappos*, 561 U.S. 593 (2010).

268. Software patent invalidation through IPRs is especially on the rise. See T. Vann Pearce, Jr. & Christopher Higgins, *The Effect of Alice and Its Progeny in 2020 on Software and 3D Printing Patents*, ORRICK, <https://www.orrick.com/Articles/The-Effect-of-the-Alice-Decision-on-Software-and-3D-Printing-Patents> [<https://perma.cc/U85F-2XLR>] (enumerating cases); Samuel Hayim & Kate Gaudry, *Eligibility Rejections Are Appearing in Greater Frequency Across All Computer Related Technology Centers*, IP WATCHDOG (May 24, 2018, 7:15 AM), <https://ipwatchdog.com/2018/05/24/eligibility-rejections-greater-frequency-uspto/id=97615/> [<https://perma.cc/XU7Z-UC6P>].

269. Most patent grants in the U.S. are software patents. *Patent Statistics*, *supra* note 85. Software patent and copyright litigation remains an active and lucrative practice area. See AM. INTEL. PROP. L. ASSOC., *supra* note 108.

computer programs from most patent and copyright protection. The net result of this switch, if implemented, would be a software IP scheme comprising short-term, automatic protection against anticompetitive copying; long-term copyright protection against literal copying of entire programs; and trademark and trade secret protections as they exist today.

V. CASE STUDIES

A. Orchestra

This Article's Introduction tells the story of Orchestra's flagship app, Mailbox, and its hugely popular approach to email. The app was differentiated by novel features like the use of swipe gestures, "snoozing," and auto-sorting based on past behavior. Five weeks after launching the app, the company merged with Dropbox to try to build out enough computing infrastructure to meet demand. But even with Dropbox's resources, Mailbox was unable to establish a foothold before Microsoft, Google, and Apple all released virtually identical products and crowded the new entrant out of the market.²⁷⁰

270. See *supra* Introduction.

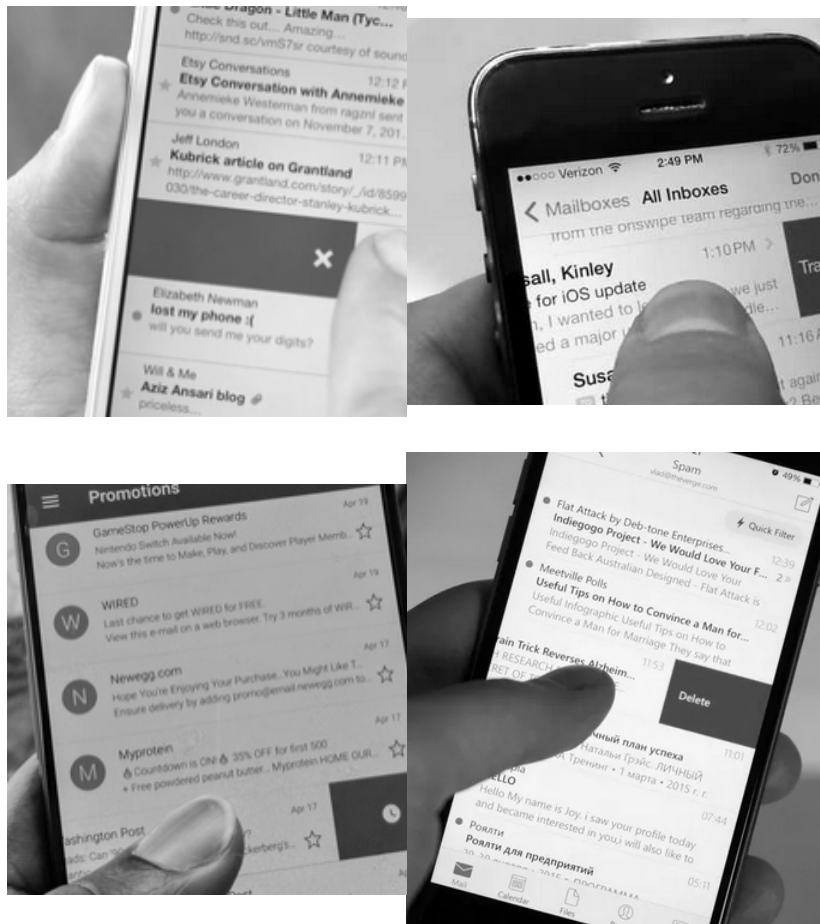


Figure 1. Promotional Material Announcing the Swipe Gesture in Press Releases from Mailbox, Apple, Google, and Microsoft (chronological order, left to right, top to bottom).

This example demonstrates a few things. First, it is a concrete example of why interface design is not defensible. Second, this shows how extreme scale advantages are: even a multi-billion-dollar company specializing in large-scale infrastructure could not compete with the “big tech” behemoths. Third, some context: this was early in the smartphone era—smartphones had just passed fifty percent adoption in the U.S.—and Dropbox burned hundreds of millions of dollars on this attempt.²⁷¹ There

271. Alex Cocotas, *U.S. Smartphone Penetration Hits 50 Percent*, BUS. INSIDER (Mar. 30, 2012, 12:09 PM), <https://www.businessinsider.com/us-smartphone-penetration-2012-3> [<https://perma.cc/M9VE-LW29>]; *A Company Called “Dropbox” Is*

are few examples of similar stories from after 2013, perhaps because these early examples set a strong precedent that nudged investors and founders away from direct competition with incumbents.²⁷²

B. Instagram

Facebook's 2012 acquisition of Instagram has garnered a great deal of attention from commentators and policymakers.²⁷³ Notably, the FTC challenged the acquisition, alleging that Facebook adopted a strategy of buying potential competitors to remove them from the market.²⁷⁴ Instagram's product would inarguably have posed a competitive threat if allowed to reach Facebook's scale. The FTC's challenge raises an interesting counterfactual: could Instagram have grown large enough had it not been acquired? There are two ways this could have happened: Instagram could have grown into a competitor on its own, or a company other than Facebook could have acquired Instagram.

Like Mailbox, Instagram's only market differentiator and asset was its interface design: at the time of acquisition it held no patents,²⁷⁵ had no unique backend tech,²⁷⁶ and had only thirteen employees.²⁷⁷ Instagram

Taking over the World, ECONOMIST (Dec. 22, 2012, 11:04 AM), <https://www.businessinsider.com/dropbox-is-taking-over-the-world-2012-12>.

272. Another theory: perhaps because many of the interaction challenges raised by smartphones were solved after the initial flurry of innovation in the early 2010s.

273. See, e.g., Salvador Rodriguez, *As Calls Grow To Split up Facebook, Employees Who Were There for the Instagram Acquisition Explain Why the Deal Happened*, CNBC, <https://www.cnbc.com/2019/09/24/facebook-bought-instagram-because-it-was-scared-of-twitter-and-google.html> [<https://perma.cc/7NN4-T7H8>] (Sept. 24, 2019, 1:58 PM); Ben Sperry, *Killer Acquisition or Successful Integration: The Case of the Facebook/Instagram Merger*, THE HILL (Oct. 8, 2020, 2:00 PM), <https://thehill.com/blogs/congress-blog/politics/520211-killer-acquisition-or-successful-integration-the-case-of-the/>; Astead W. Herndon, *Elizabeth Warren Proposes Breaking up Tech Giants Like Amazon and Facebook*, N.Y. TIMES (Mar. 8, 2019), <https://www.nytimes.com/2019/03/08/us/politics/elizabeth-warren-amazon.html>.

274. Complaint at 2, *FTC v. Facebook, Inc.*, 581 F. Supp. 3d 34 (D.D.C. Jan. 13, 2021) (No. 20-cv-03590).

275. USPTO, PATENT PUBLIC SEARCH, <https://ppubs.uspto.gov/pubwebapp/> (last visited Aug. 19, 2023) (showing that a patent search yielded no results).

276. See, e.g., Instagram Eng'g, *What Powers Instagram: Hundreds of Instances, Dozens of Technologies*, MEDIUM: INSTAGRAM ENG'G (Dec. 2, 2011), <https://instagram-engineering.com/what-powers-instagram-hundreds-of-instances-dozens-of-technologies-adf2e22da2ad> [<https://perma.cc/657U-VFMV>].

277. Avery Hartmans, *Instagram Is Celebrating Its 10th Birthday. A Decade After Launch, Here's Where Its Original 13 Employees Have Ended Up*, BUS. INSIDER, <https://www.businessinsider.com/instagram-first-13-employees-full-list-2020-4#maykel-loomans-was-one-of-three-employees-who-joined-instagram-right-before-it-was-acquired-1> (Oct. 2, 2020, 11:32 AM); Kim-Mai Cutler, *Instagram Reaches 27 Million Registered Users and Says Its Android App Is Nearly Here*, TECHCRUNCH (Mar. 11,

had 27 million signups; Facebook had billions of monthly active users.²⁷⁸ Instagram had recently taken weeks to prepare for a one-day million-user influx.²⁷⁹ Facebook estimated it would take one to two years to copy every major feature in the social app ecosystem and was ready to do so.²⁸⁰ Even if every Facebook user signed up to use Instagram, it seems exceedingly unlikely that Instagram could have independently built the infrastructure necessary to compete with Facebook quickly enough to prevent a clone.

Could another company have acquired and scaled Instagram quickly enough to challenge Facebook?²⁸¹ For the same reasons Dropbox could not scale Mailbox quickly enough to compete with Google, only companies with the infrastructure to support a social graph with billions of users were viable merger partners, which left few options. Google, which had recently launched its Google+ (G+) social network, seemed well positioned to acquire Instagram.²⁸² But would a Google acquisition have increased competition? Probably not: Facebook and Google were an effective duopoly in the market for online targeted advertising, which they both used to monetize their products. Facebook viewed G+ as an existential threat.²⁸³ A Facebook win in the social media space would leave the duopoly in place; a G+ win would create a monopoly. The FTC complaint and associated commentary lean heavily on a series of

2012, 4:04 PM), <https://techcrunch.com/2012/03/11/instagram-reaches-27-million-registered-users-shows-off-upcoming-android-app/> [<https://perma.cc/5EQ7-8PAG>].

278. Drew Olanoff, *Facebook Announces Monthly Active Users Were at 1.01 Billion as of September 30th, an Increase of 26% Year-over-Year*, TECHCRUNCH (Oct. 23, 2012, 3:08 PM), <https://techcrunch.com/2012/10/23/facebook-announces-monthly-active-users-were-at-1-01-billion-as-of-september-30th/> [<https://perma.cc/WXC4-MT7E>]; *Number of Monthly Active Facebook Users: Global (Q4 2009 – Q1 2022)*, GLOBALDATA, <https://www.globaldata.com/data-insights/technology--media-and-telecom/number-of-monthly-active-facebook-users-global/> (last visited Aug. 12, 2023). Note that Facebook numbers count monthly actives, while Instagram numbers count total signups. Instagram actives is likely much lower.

279. See Instagram Eng'g, *Keeping Instagram up with over a Million New Users in Twelve Hours*, MEDIUM: INSTAGRAM ENG'G (Apr. 2, 2012), <https://instagram-engineering.com/keeping-instagram-up-with-over-a-million-new-users-in-twelve-hours-b75298b782c5>.

280. E-mail from Mark Zuckerberg to David Ebersman (Feb. 28, 2012, 9:55 PM) [<https://web.archive.org/web/20200730031151/https://judiciary.house.gov/uploadedfiles/0006322000063223.pdf>] (“[W]e already know these companies’ [interface designs] and will integrate them over the next 12-24 months. . . . [I]f we incorporate [those designs] those new products won’t get much traction since we’ll already have their mechanics deployed at scale.”).

281. See, e.g., Hemphill, *supra* note 116, at 1993.

282. See, e.g., GARCÍA MARTÍNEZ, *supra* note 145, at 489.

283. See *id.* at 286.

emails among Facebook executives. The emails describe acquiring Instagram as an attempt to neutralize a competitive threat.²⁸⁴ Read in context, those emails seem just as likely to be concerned with the threat posed by Google as the one posed by Instagram.²⁸⁵ What about Twitter?²⁸⁶ There are echoes of the Dropbox/Orchestra lesson here. Twitter's text-heavy service was experiencing capacity-based outages that would take them another two years to solve, even with about five percent as many users as Facebook and a focus on text.²⁸⁷ Adding a second, photo-heavy social network to the mix certainly wouldn't speed up the task of pushing through capacity barriers.

Applying the misappropriation framework from Part IV might have allowed Instagram to exist independently.²⁸⁸ By preventing Google and Facebook from copying Instagram's designs until Instagram had a chance to reach some critical scale, it may have been able to establish itself in the social media space, potentially growing large enough to compete in ad markets as well. Even if Instagram failed to scale,²⁸⁹ without the specter of ruinous copying, more investors and entrepreneurs might have taken their shot at building on top of Instagram's market insights.

284. See Complaint, *supra* note 274, at 2, 4–5.

285. For example, is Mark Zuckerberg's concern about a "competitive threat" the one posed by Instagram, Instagram's potential acquirer, or Instagram clones every social media company was about to race to implement? *E.g.*, E-mail from Mark Zuckerberg to David Ebersman (Feb. 27, 2012, 11:41 PM) [<https://web.archive.org/web/20200730031151/https://judiciary.house.gov/uploadedfiles/0006322000063223.pdf>] ("[T]he brands are already meaningful and *if they grow to a large scale* they could be very disruptive to us." (emphasis added)).

286. See Jennifer Van Grove, *Revealed: How Twitter's Secret Offer for Instagram Made Facebook Pay \$1B*, REUTERS (Apr. 29, 2012, 12:30 PM), <https://www.reuters.com/article/idUS101837003020120426>.

287. Mat Honan, *Killing the Fail Whale with Twitter's Christopher Fry*, WIRED (Nov. 25, 2013, 9:30 AM), <https://www.wired.com/2013/11/qa-with-chris-fry/> [<https://perma.cc/EJJ9-WRTN>].

288. Running through the factors from Section IV.A.2, if Facebook had cloned Instagram, the analysis might go something like this: (1) [Plaintiff Costs] Like most startups, Instagram "bet the company" on their app. (2) [Defendant Cost Avoidance] Facebook did not have to spend a bunch of time and reputation launching failed photo apps. (3) [Competitive Context] Instagram generated the demand for an Instagram-like app, and Facebook capitalized on that demand. (4) [Competitive Harm] Facebook entered that market before Instagram could have tried to capture the opportunity themselves. (5) [Public Interest] A monopoly engaged in ruinous copying is likely to stifle competition.

289. The other companies identified as potential acquirers in the leaked Facebook emails—Path and Foursquare—developed "check in" apps that eventually lost to Facebook features. See *Read the Leaked Facebook Documents*, NBC NEWS, <https://dataviz.nbcnews.com/projects/20191104-facebook-leaked-documents> [<https://perma.cc/H58M-3C6F>].

C. Generative AI

The ChatGPT text generator and MidJourney image generator were surprise successes.²⁹⁰ Even though huge incumbent companies, including Alphabet and Meta (née Google and Facebook), had quietly built similar technologies years before ChatGPT launched, they had not taken the risk of releasing those AIs as products. OpenAI and MidJourney, the preeminent AI startups, are now working their way through a legal and PR gauntlet while major tech incumbents slowly build out their infrastructure.²⁹¹

Big tech companies are basically giving away the tools to build generative AI. For example, Amazon, Google, and Microsoft own most of the specialized hardware needed to train generative AI but are letting other companies use that hardware practically at-cost.²⁹² Facebook recently published a fully trained generative AI model under a broad commercial license.²⁹³ The only limit on both resources is scale: once companies reach \$700 million in annual revenue or have computing needs comparable to a big tech company, they lose access to big tech's infrastructure and data.²⁹⁴

290. Sarah Jackson, *OpenAI Executives Say Releasing ChatGPT for Public Use Was a Last Resort After Running into Multiple Hurdles — and They're Shocked by Its Popularity*, BUS. INSIDER (Jan. 25, 2023, 4:28 PM), <https://www.businessinsider.com/chatgpt-openai-executives-are-shocked-by-ai-chatbot-popularity-2023-1>.

291. Amazon, Google, and Meta probably control most of the specialized H100 processors used to perform AI computation. See Madhumita Murgia, Andrew England, Qianer Liu, Eleanor Olcott & Samer Al-Atrush, *Saudi Arabia and UAE Race To Buy Nvidia Chips To Power AI Ambitions*, FIN. TIMES (Aug. 14, 2023), <https://www.ft.com/content/c93d2a76-16f3-4585-af61-86667c5090ba> (reporting that over half a million H100 chips will be produced globally in 2023, primarily to U.S. tech companies). Stitching together the tea leaves from purchase announcements, Google, Amazon, Meta, and Microsoft have all publicly announced five-figure supplies of H100s available for rent, and trade reports suggest similar scale internal investments. See Roy Kim & Chris Kleban, *Announcing A3 Supercomputers with NVIDIA H100 GPUs, Purpose Built for AI*, GOOGLE CLOUD BLOG (May 10, 2023), <https://cloud.google.com/blog/products/compute/introducing-a3-supercomputers-with-nvidia-h100-gpus>. In total, that would account for over fifty percent of the current H100 supply.

292. PAUL FRIEDL & GABRIEL NICHOLAS, REGULATING LARGE LANGUAGE MODELS: A ROUNDTABLE REPORT 13–14 (2024) (noting that the price for access to computing hardware remains affordable despite a hardware shortage and only a handful of actors with access to any of the hardware necessary to train modern AI).

293. *Llama*, META, <https://llama.meta.com/> (last visited Apr. 7, 2024).

294. Facebook's license limits use based on monthly active users. *Llama 2 Community License Agreement – Meta AI*, META, <https://ai.meta.com/llama/license/> (last visited Apr. 7, 2024). Cloud providers use as much of their computing capacity as they

The simplest explanation for this behavior is that there is some benefit to essentially removing the technical and infrastructural barriers to entry for startups and mid-size companies experimenting with ways to turn generative AIs into products. If these companies are operating under the assumptions in this Article's account, their behavior is unsurprising. By removing the barriers blocking market experimentation they encourage disruptive interface innovation and let other companies risk loss of goodwill and legal exposure. By retaining a monopoly on the infrastructure needed for rapid iterative improvements and scale, tech incumbents retain the ability to profit from any major market discoveries in the AI space. Big tech companies have also insured themselves against a sudden winner in the market by taking a large (but not quite controlling) interest in the biggest players.²⁹⁵ By this Article's account, tech incumbents should be expected to move into the generative AI space in force shortly after the appropriate product emerges and the worst of the reputational and legal risks subside.

CONCLUSION

This Article skips over a foundational question: is tech innovation and competition a worthy policy goal? Tech innovation creates social problems faster than regulators can respond; problems like facial recognition, digital currencies, deepfakes, and misinformation are all products of rapidly evolving tech capabilities.

At the same time, there is an argument that the concentrated, ad-driven tech market is one of the most globally progressive transfers of wealth and knowledge in history. In Google and Facebook's mad rush to find more users, they massively subsidized new communication infrastructure and economic development in the global south, and most internet services are zero-price. Services are paid for by manipulating

need, and other companies renting from them are limited to the resources each provider makes publicly available.

295. See Dina Bass, *Microsoft Invests \$10 Billion in ChatGPT Maker OpenAI*, BLOOMBERG L. (Jan. 23, 2023, 3:23 AM), <https://www.bloomberg.com/news/articles/2023-01-23/microsoft-makes-multibillion-dollar-investment-in-openai>; *Microsoft and OpenAI Extend Partnership*, OFF. MICROSOFT BLOG (Jan. 23, 2023), <https://blogs.microsoft.com/blog/2023/01/23/microsoftandopenaiextendpartnership/>; Davey Alba & Dina Bass, *Google Invests Almost \$400 Million in ChatGPT Rival Anthropic*, BLOOMBERG L. (Feb. 3, 2023), <https://www.bloomberg.com/news/articles/2023-02-03/google-invests-almost-400-million-in-ai-startup-anthropic>; Steve Mollman, *Google Is Investing \$300M in an OpenAI Challenger that Will Take on ChatGPT While Focusing on A.I. Safety*, FORTUNE (Feb. 4, 2023, 4:49 PM), <https://fortune.com/2023/02/04/google-invests-300m-anthropic-openai-rival-making-chatgpt-challenger-claude-ai-chatbot-battle/>.

advertising targets—especially those with excess leisure time and discretionary income—into spending their resources with advertisers. Tech incumbents also jealously guard user data and employ cybersecurity teams that rival most advanced nations, which reduces some digital risks far below their competitive or regulated equilibria.²⁹⁶

Still, there is a wide range of reasons to be concerned about concentration in the digital platform industry, including the concentration of political and economic power to the risk of traditional anticompetitive harms.²⁹⁷ Reduced innovation rates are especially important because Western tech markets do not exist in a closed system. U.S. tech innovation has cooled recently, allowing foreign challenges to U.S. firms' dominance in Western markets.²⁹⁸ If Western regulators want to maintain the outsized normative influence over the development of the internet that their jurisdictional position affords—and normative concerns with platform power suggests they very much do—then increasing innovation levels in consumer tech services should be a priority.

If tech innovation and competition are worthy policy goals, then software copy protections need an update. The principles that motivated software IP fifty years ago—that IP should make copying harder when it would discourage innovation and should carefully avoid granting unnecessary market power—remain valid, but their application has fallen out of sync with the modern context. This Article's proposal—to replace software-specific IP laws with market-oriented trade regulation—would modernize software copy protection and increase the law's resilience to future technical change.

296. See Stein, *supra* note 97, at 461.

297. See *supra* Section II.C (enumerating many of those concerns in details).

298. See Dan Wang, *China's Hidden Tech Revolution: How Beijing Threatens U.S. Dominance*, FOREIGN AFFS., Mar./Apr. 2023, at 65, 66.