

Ecosystem Entanglement

Friso Bostoen*

The major digital ecosystems are not only competitors but also partners. The entanglement between them can take different forms, from providing key complements, over establishing joint ventures, to taking equity or board seats. Whatever the form, such ‘ecosystem entanglement’ can result in softened competition. Indeed, it is an important reason that core platform markets like search, browsers and app stores have seen little rivalry, even after they were opened up by the EU’s Digital Markets Act. This paper describes the various forms of ecosystem entanglement and the underlying anticompetitive mechanism (Section 2), provides a preliminary framework for analysis (Section 3), and puts forward ‘enemy remedies’ as a solution (Section 4). While ecosystem entanglement’s effects on competition are pernicious, assessing them in terms of collusion and designing remedies that set partners up as enemies can help drive competition where there has been little.

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1. Introduction

The Digital Markets Act (DMA) pursues contestability.¹ It understands contestability as the ability of firms to overcome barriers to entry in digital markets and to ‘challenge the gatekeeper on the merits of their products and services’.² The DMA’s concept of contestability is different from that of Baumol et al., who launched the idea of ‘contestable markets’ in the 1980s.³ They argued that, to avoid market failure, it is not necessary for a monopolist to face *actual* competition. The simple *threat* of competition suffices to keep the

* Assistant Professor of Competition Law & Digital Regulation, Tilburg University. Correspondence: <f.bostoen@tilburguniversity.edu>. The paper is current until 1 February 2025. In accordance with the ASCOLA Declaration of Ethics, I have nothing to disclose.

¹ Regulation (EU) 2019/1150 of the European Parliament and of the Council on promoting fairness and transparency for business users of online intermediation services [2019] OJ L186/57 (hereafter: DMA), art 1(1).

² DMA, recital 32.

³ William Baumol, John Panzar, Robert Willig, *Contestable Markets and the Theory of Industry Structure* (Harcourt Brace Jovanovich 1982). More specifically, the theory is predicated on a lack of entry and exit barriers (e.g., sunk costs) as well as equal access to technology.

monopolist in check. The logic was as follows: if the monopolist exploited its market power (e.g., by overcharging), competitors would enter the market, which is why the monopolist does not exploit its market power in the first place. Of course, the theory's validity was restricted to markets with low entry barriers, i.e., *contestable* markets.⁴

The DMA, however, pursues more than contestable markets. It seeks to lower entry barriers not just so that gatekeepers are threatened with competition; it wants firms to come in and actually compete with them. In other words, the DMA's goal is *contested* markets. The DMA does not specify which firms it seeks to support in challenging gatekeepers. The obligation forcing Google to give access to its search data,⁵ for example, could be relied on by a startup to build a search engine just as well as it could be used by Microsoft to improve Bing. This contrasts with the Data Act, which explicitly bans gatekeepers from benefitting from its data access obligations.⁶ The absence of a similar ban in the DMA could be read as a recognition of the fact gatekeepers are likely each other's strongest challengers.⁷ After all, which other firms have the technological capabilities and financial heft to build something as complex and capital-intensive as a search engine?

The fact that gatekeepers are best placed to contest each other's positions of incumbency can be corroborated by a quick survey of the markets in scope of the DMA. As a reminder: the DMA applies to gatekeepers in ten core platform services (CPSs), including online intermediation (app stores, marketplaces), search, social networking, operating systems (OSs) and browsers.⁸ At the time of writing, seven gatekeepers in those services have been designated: the GAFAM (Google/Alphabet, Apple, Facebook/Meta, Amazon, Microsoft), ByteDance (TikTok) and Booking.com.⁹

As suggested before, Microsoft, along with Apple, is in the best position to contest Google's search monopoly.¹⁰ Microsoft is the only other firm with a competitive search index, though it needs to receive more user queries to effectively train its search algorithm. Apple could channel its many iOS users towards its own search engine to learn quickly, though it would need to build out its search index (or license Microsoft's). What about Apple's app distribution monopoly in iOS? Google, which already has an app store with a critical mass of developers (Google Play), is clearly best-placed to enter iOS app distribution.¹¹ Apple and

⁴ The theory has been subject to strong criticism, see, e.g., William Shepherd, 'Contestability vs. Competition—Once More' (1995) 71 *Land Economics* 299. Part of the criticism relates to the theory's convenient favorability to AT&T, for which Panzar worked at the time.

⁵ DMA, art 6(11).

⁶ Regulation (EU) 2023/2854 of the European Parliament and of the Council on harmonised rules on fair access to and use of data, PE/49/2023/REV/1, recital 40, arts 5(3) and 6(2)(d).

⁷ An argument made by Nicolas Petit, *Big Tech and the Digital Economy: The Mologopoly Scenario* (Oxford University Press 2020).

⁸ DMA, art 2(1).

⁹ See Friso Bostoen and Giorgio Monti, 'The Rhyme and Reason of Gatekeeper Designation under the Digital Markets Act' (2024) TILEC Discussion Paper No. 2024-16. All designation decisions are available at <<https://digital-markets-act-cases.ec.europa.eu/search>>.

¹⁰ For background, especially on Google–Microsoft, see Competition & Markets Authority, 'Online platforms and digital advertising' (Market study final report, 1 July 2020).

¹¹ For background, see Competition & Markets Authority, 'Mobile ecosystems' (Market study final report, 10 June 2022).

Google share a mobile OS duopoly. If any firm can challenge it, it's Meta, which has already spent around \$50 billion developing its hoped-for successor to mobile: virtual reality.¹²

The above cases point to some of the reasons that gatekeepers are each other's strongest challengers. First, on the supply side, they hold critical building blocks to build CPSs (e.g., Microsoft's search index). Second, on the demand side, they can leverage their users to kickstart network and learning effects (e.g., iOS users). Third, they may already provide the CPS in question in their own ecosystem, which means they simply have to transfer it to a competing ecosystem rather than building it from scratch (e.g., Google Play). Fourth, challenging a gatekeeper position is an expensive proposition. While capital markets can theoretically provide the required funding, gatekeepers already have those funds on their balance sheets (e.g., Meta).

If gatekeepers are best placed to contest each other's position—that is, they have the ability (or capabilities)¹³ to do so—then the question is whether they have enough of an incentive to do so. The expected profitability of a gatekeeper position in an additional CPS certainly provides something of an incentive. But my argument is that the incentive is limited by the degree to which gatekeepers are active in each other's ecosystems—a dynamic I call 'ecosystem entanglement'.¹⁴

The paper is structured as follows. Section 2 unpacks the concept of ecosystem entanglement. After some illustrations, it lays bare the drivers of such entanglement as well as the anticompetitive mechanism underlying it. Section 3 then goes into the legal analysis. While the primary case of ecosystem entanglement, *U.S. v Google*, was assessed as unilateral conduct, it can equally be viewed through the lens of collusion.¹⁵ The section is kept short as the focus is on remedies, which are discussed in Section 4. The DMA provides little to no remedy for entanglement, and the effectiveness of antitrust remedies is an open question. Hence, the section provides recommendations to increase the effectiveness of DMA and antitrust enforcement in this area.

2. Ecosystem Entanglement

Let us start by exploring the concepts of 'ecosystem' and 'entanglement'. Ecosystems can be seen as an extension of platforms.¹⁶ A multisided platform intermediates between (at least) two different types of actors: on one side, suppliers (e.g., developers, sellers or advertisers);

¹² Matthew Ball, 'Big Tech's Biggest Bets (Or What It Takes to Build a Billion-User Platform)' (30 May 2023) <<https://www.matthewball.co/all/bigtechbiggestbets>>.

¹³ See David Teece and Gary Pisano, 'The Dynamic Capabilities of Firms: An Introduction' (1994) 3 *Industrial and Corporate Change* 537.

¹⁴ It appears this term has been used, at least once, in ecology research, see Kevin McCann et al., 'Ecosystem Entanglement and the Propagation of Nutrient-Driven Instability' (2020) *bioRxiv* 2020.04.20.050302 (the paper was later published in *Ecology Letters* without any reference to entanglement).

¹⁵ Similarly seeing the case as one of collusion, in particular a non-compete arrangement, see Omar Vasquez Duque, 'Monopolization by Exploiting People's Inertia? On the DOJ's 2020 Complaint Against Google and Revenue Sharing Agreements as Non-Compete Arrangements' (2024) 75 *UC Law Journal* 1403.

¹⁶ Even if the ecosystem literature preceded the literature on multisided markets, see James Moore, 'Predators and Prey: A New Ecology of Competition' (1993) 71 *Harvard Business Review* 75, available at <<https://hbr.org/1993/05/predators-and-prey-a-new-ecology-of-competition>>.

on the other, consumers.¹⁷ Every platform is therefore at the center of a ‘multi-actor ecosystem’.¹⁸ The ecosystem literature is useful mostly for its focus on how platforms provide the technological foundation for a variety of complements and thus orchestrate ‘multi-product ecosystems’. Most complements are provided by independent suppliers (‘complementors’), but orchestrators will also host their own complements, especially in ecosystem niches of strategic importance.¹⁹

Entanglement stems from the fact that the dominant platforms are key investors in and complementors to each other’s ecosystems. The dominant platforms have always played nice with each other, from non-poaching agreements²⁰ to legal truces.²¹ But non-aggression is guaranteed mostly by ecosystem entanglement. Consider the example of Apple. In 1997, Microsoft saved the company with a \$150 million investment and a guarantee that it would continue to develop software (including the must-have Office suite) for the floundering Mac for at least five years.²² This was crucial, as Jobs acknowledged later: ‘Microsoft was the biggest software developer outside of Apple developing for the Mac.’²³ But in announcing the partnership, he also revealed a shifting understanding of competition:

Apple lives in an ecosystem and it needs help from other partners, it needs to help other partners. And relationships that are destructive don’t help anybody in this industry ... We have to let go of this notion that for Apple to win Microsoft has to lose. ... So, the era of setting this up as a competition between Apple and Microsoft is over as far as I’m concerned.²⁴

Microsoft would not be Apple’s last partner. In 2006, Google CEO Eric Schmidt joined Apple’s board.²⁵ At that time, iOS was in development while Google had just purchased Android OS. Schmidt later had to step down due to conflicts of interest (and associated scrutiny from the Federal Trade Commission),²⁶ but the firms stayed entangled. At the

¹⁷ Jean-Charles Rochet and Jean Tirole, ‘Platform competition in two-sided markets’ (2003) 1 Journal of the European Economic Association 990.

¹⁸ For the first distinction between multi-actor and multi-product ecosystems, see Michael Jacobides, ‘How to Compete When Industries Digitize and Collide: An Ecosystem Development Framework’ (2022) 64 California Management Review 99, which relies in part on the unpublished Michael Jacobides, Carmelo Cennamo, and Annabelle Gawer, ‘Distinguishing between Platforms and Ecosystems: Complementarities, Value Creation, and Coordination Mechanisms’ (2020) London Business School Working Paper.

¹⁹ James Moore, *The Death of Competition: Leadership & Strategy in the Age of Business Ecosystems* (HarperBusiness 1996) 75–79.

²⁰ Case 1:10-cv-01629 (RBV), *United States v. Adobe Systems, Inc., Apple Inc., Google Inc., Intel Corporation, Intuit, Inc. and Pixar* (D.D.C. 2011).

²¹ Dave Lee, ‘Google and Microsoft agree to lawsuit truce’ (BBC, 1 October 2015) <<https://www.bbc.com/news/technology-34409077>>.

²² ‘The Apple of Microsoft’s Eye’ (*The New York Times*, 8 August 1997) <<https://www.nytimes.com/1997/08/08/opinion/the-apple-of-microsoft-s-eye.html>>. See further Walter Isaacson, *Jobs* (Simon & Schuster 2011), 296–300 and, for context, Chapter 16.

²³ Catherine Clifford, ‘When Microsoft saved Apple: Steve Jobs and Bill Gates show eliminating competition isn’t the only way to win’ (CNBC, 29 August 2017) <<https://www.cnbc.com/2017/08/29/steve-jobs-and-bill-gates-what-happened-when-microsoft-saved-apple.html>>.

²⁴ For a transcript, see Ben Thompson, ‘Steve Jobs at Macworld Boston in 1997’ (*Stratechery*, 27 June 2013) <<https://stratechery.com/2013/steve-jobs-at-macworld-boston-in-1997/>>.

²⁵ Eric Schmidt, *How Google Works* (John Murray 2017) 202.

²⁶ Federal Trade Commission, ‘Statement of Bureau of Competition Director Richard Feinstein Regarding the Announcement that Google CEO Eric Schmidt Has Resigned from Apple’s Board’ (press release, 3

iPhone's launch, Google's YouTube and Maps were the only non-Apple apps pre-installed.²⁷ As the iPhone did not have an app store at the time, the two apps were particularly important to the device's initial success.²⁸ At the same time, a more lasting arrangement was made: Google would provide the default search engine for Safari.²⁹

The mix of competition and cooperation presented by scenarios of entanglement is not entirely new. In the 1990s, it was first described as 'co-opetition'.³⁰ Others have examined the relation as one of 'frenemies'.³¹ But scholarship has focused mainly on co-opetition between platforms/ecosystems and independent complementors—not on the relations between platforms/ecosystems themselves.³² The drivers of that relationship are a bit more complex.

Entanglement starts from the simple fact that ecosystems, by definition, rely on third-party complements.³³ In that sense, Moore has described the management of ecosystems as a constant navigation of cooperative and competitive challenges.³⁴ However, an ecosystem orchestrator does not want to depend on *another* ecosystem orchestrator with which it also competes.³⁵ First, if it depends on the complement provided by the other orchestrator to entice consumers, it will have to divide the ecosystem rents with that orchestrator.³⁶ Second, the first ecosystem orchestrator is under a constant threat of opportunism by the second, who could withdraw the complement to foreclose competition. This threat is unique to ecosystem entanglement, as complementors who do not compete with the ecosystem in other markets will have no foreclosure incentive.

August 2009) <<https://www.ftc.gov/news-events/news/press-releases/2009/08/statement-bureau-competition-director-richard-feinstein-regarding-announcement-google-ceo-eric>>.

²⁷ Brian McCullough, *How the Internet Happened: From Netscape to the iPhone* (Liveright Publishing 2018) 317.

²⁸ Brian Merchant, *The One Device: The Secret History of the iPhone* (Corgi 2017) 168–169 ('When I asked the iPhone's architects what they thought its first must-use function was, Google Maps was probably the most frequent answer').

²⁹ Case No. 20-cv-3010 (APM), *United States et al. v. Google LLC* (D.D.C. 2024), paras 315–317.

³⁰ Adam Brandenburger and Barry Nalebuff, *Co-Opetition* (Crown Business 1996).

³¹ Ariel Ezrachi and Maurice Stucke, *Virtual Competition: The Promise and Perils of the Algorithm-Driven Economy* (Harvard University Press 2016), Part III. Frenemies.

³² With a similar platform/ecosystem–complementor focus, see Dong Kyoonyoung et al., 'Coopetition in a platform ecosystem: from the complementors' perspective' (2022) 24 *Electronic Commerce Research* 1509.

³³ In addition to this business strategy explanation, there may be a cultural factor at play, with co-opetition being ingrained in Silicon Valley, and venture capitalists (VCs) fostering it to safeguard their investments. Someone with first-hand experience reflected on it as follows:

VCs are always walking this fine line between competition and cooperation ... The whole identity of a VC partnership revolves around managing the relationship between their portfolio companies—around taking advantage of that when it is appropriate and not causing a problem when it is not appropriate.

See Sebastian Mallaby, *The Power Law: Venture Capital and the Making of the New Future* (Penguin 2022) 94–95, 107–109, 202–204, 246–248 (with quote at 108).

³⁴ James Moore, *The Death of Competition* (n X) 83. See also Adam Brandenburger and Barry Nalebuff, 'The Rules of Co-opetition' (2021) *Harvard Business Review* January–February (on the complexity of co-opetition in the tech industry given the 'multiple relationships' firms have with one another).

³⁵ For background, see Carliss Baldwin, *Design Rules, Volume 2: How Technology Shapes Organizations* (MIT Press 2024), in particular Chapter 13.

³⁶ This is the origin of the business strategy adage 'commoditize your complements', see Carl Shapiro and Hal Varian, *Information Rules: A Strategic Guide to the Network Economy* (Harvard Business School Press 1999), Chapters 2 and 9; Joel Spolsky, 'Strategy Letter V' (*Joel on Software*, 12 June 2002) <<https://www.joelonsoftware.com/2002/06/12/strategy-letter-v/>>.

As a result, ecosystem orchestrators tend to avoid entanglement, in particular by developing their own key complements.³⁷ It is not surprising that Apple itself provides almost all the key apps on iOS.³⁸ There will always be exceptions: complements that are crucial but that only another ecosystem orchestrator is able to provide—say, a maps app, office suite, or search engine. But given that entanglement can be costly and risky, for the reasons set out above, it tends to be short-lived. In 2012, Apple ditched Google Maps for its own mapping app, apparently because Google would not make turn-by-turn navigation available on iOS—a potential attempt at foreclosure.³⁹ The relationship with Microsoft did not get as contentious, but Apple nevertheless developed its iWork suite as an alternative to Office.⁴⁰

Google’s search engine, by contrast, was never replaced by Apple. The reason is the underlying agreement, according to which Apple grants Google Search default placement on Safari and other access points, and Google pays Apple a share of its advertising (‘ad’) revenue on Safari and Chrome.⁴¹ The agreement is mutually beneficial. Google projected it would lose 65% of its revenue without the default placement.⁴² Apple’s 2022 revenue share from Google amounted to \$20 billion, or 15–20% of its operating profit.⁴³ Apple has taken steps to build its own search engine but, even in a best-case scenario, launching it to replace Google would cost it \$12 billion during the first five years.⁴⁴

While the agreement benefits Apple and Google, it does not benefit society.⁴⁵ The agreement forecloses a substantial share of the search market, impairing the opportunities of rivals to compete. Those rivals are denied the necessary queries (scale) to improve their search engine and ad systems, so that they cannot become serious competitors. Incentives to invest and innovate are greatly reduced. One can point to upstarts like Neeva that had to exit the market despite boasting an innovative product,⁴⁶ but the greatest loss of innovation is likely Apple’s non-entry.⁴⁷

While the court analyzed the agreement as unilateral conduct (monopolization) by Google, the mechanism with Apple specifically is akin to a collusive one. According to the court, the agreement is unquestionably ‘capable of significantly contributing to keeping Apple on the

³⁷ Or, alternatively, dealing with less powerful complementors that could potentially be bought.

³⁸ Whenever Apple develops another app to add to its iOS portfolio, it replaces the complementors in that space, who may have inspired the app—a process dubbed ‘Sherlocking’, see US House of Representatives – Judiciary Subcommittee on Antitrust, ‘Investigation of Competition in Digital Markets’ (Majority Staff Report and Recommendations, 2020) 363–366.

³⁹ Dawinderpal Sahota, ‘Apple ditches Google Maps, cosies up to Facebook’ (*Telecoms*, 12 June 2012) <<https://www.telecoms.com/mobile-devices/apple-ditches-google-maps-cosies-up-to-facebook/>>.

⁴⁰ See <<https://www.apple.com/iwork/>>.

⁴¹ *United States et al. v. Google LLC* (n X), Section VI.A.1.

⁴² *Ibid.*, para 300. Although not specified in the judgment, this is presumably 65% of Google’s revenue on iOS.

⁴³ *Ibid.*, para 299. The revenue share amounted to 17.5% of Apple’s operating profit in 2020, but Apple’s Form 10-K suggests the percentage would not be too dissimilar in 2022.

⁴⁴ *Ibid.*, para 302.

⁴⁵ *United States et al. v. Google LLC* (n X), Section V.A.

⁴⁶ See David Pierce, ‘The little search engine that couldn’t’ (*The Verge*, 26 July 2023) <<https://www.theverge.com/23802382/>>.

⁴⁷ *United States et al. v. Google LLC* (n X), Section V.A.3.b.

sidelines of search, thus allowing Google to maintain its monopoly'.⁴⁸ In essence, Google splits its monopoly profit from search with Apple. If each firm's share of the monopoly profit is larger than their respective duopoly profits in the scenario where Apple would build and deploy its own search engine, the arrangement is stable. Given that the revenue-share agreement has been in place for over 15 years, that does seem to be the case.

The competitive harm from ecosystem entanglement is compounded by ripple effects beyond the complement in question. Consider, for example, browser competition on iOS. Apple requires all browsers on iOS to use its own engine (WebKit), which means that competing browsers can only provide a different interface from Safari—not improved capabilities. The DMA prohibits this requirement, thus setting the stage for more intense browser competition.⁴⁹ One would expect Google to launch an iOS version of Chrome that relies on its own browser engine (Blink). It might supercharge web apps, which could eat away at Apple's app distribution monopoly. This has not happened and Google has no reported plans to do so. As to the reason why, commentators have speculated that Google building a capable iOS browser would be 'a declaration of war', which would force it to forfeit Google Search's privileged position in iOS.⁵⁰

The anticompetitive mechanism is related to that of collusion with multi-market contacts. Apple not building a search engine is a direct consequence of its Google Search deal.⁵¹ But Google not building a capable iOS web browser is, if anything, an indirect consequence of this deal—and perhaps other deals⁵²—on different markets. Multi-market contacts are known to contribute to collusion,⁵³ but they make for a more complex theory of harm. One could make an analogy to the founding of the EU, which was meant to integrate national economies to such an extent that war became unattractive if not impossible. The entanglement between ecosystems might similarly prevent competitive aggression (or 'declarations of war'). Schmidt himself has furthered this analogy by describing his engagement with other ecosystems as 'diplomacy'.⁵⁴

The rather clear harm of the Google–Apple agreement, to search engine and perhaps wider ecosystem competition, does not mean each instance of entanglement is necessarily harmful. Some instances are likely to be procompetitive. Microsoft, for example, invested \$240 million in Facebook and for some time provided it with an ad system.⁵⁵ Once Facebook could run

⁴⁸ Ibid 242.

⁴⁹ DMA, art 5(7).

⁵⁰ David Pierce, 'The confusing state of Apple Intelligence' (*The Verge*, 25 October 2024) <<https://www.theverge.com/2024/10/25/24279264/>>.

⁵¹ In line with the ecosystem entanglement theory, we are seeing search engine competition from ecosystems with a low(er) degree of entanglement with Google, in particular Meta, see Emma Roth, 'Meta is reportedly working on its own AI-powered search engine, too' (*The Verge*, 28 October 2024) <<https://www.theverge.com/2024/10/28/24282017/>>.

⁵² E.g., a potential iOS–Gemini deal, see Wes Davis, 'Apple could announce a Google Gemini deal this fall' (*The Verge*, 30 June 2024) <<https://www.theverge.com/2024/6/30/24189262/>>.

⁵³ Douglas Bernheim and Michael Whinston, 'Multimarket Contact and Collusive Behavior' (1990) 21 *The RAND Journal of Economics* 1.

⁵⁴ Schmidt (n 8) 196–197.

⁵⁵ Steven Levy, *Facebook: The Inside Story* (Penguin 2020) 131–132 and 183–185. For the partnership announcement, see 'Facebook and Microsoft Expand Strategic Alliance Conference' (*Microsoft*, 24 October

its own ad system at scale, it took over. Microsoft keeping Apple alive in the 1990s likely also promoted desktop PC competition, even if Microsoft's incentive to do so might not have been as pure.⁵⁶ Time-limited instances of entanglement are much less likely to be harmful.

Cases of ecosystem entanglement can thus be situated on a spectrum running from clearly anticompetitive to likely procompetitive. The next section outlines a high-level framework to legally analyze instances of ecosystem entanglement.

3. Framework for Analysis Under EU Competition Law

The goal is to provide a high-level framework for the analysis of ecosystem entanglement. To keep that framework simple enough, a number of choices have to be made. First, the analysis starts from EU competition law, even if occasional references to U.S. case law are included. Second, the analysis takes the perspective of collusion, which I consider more appropriate for situations of bilateral ecosystem entanglement.

In EU competition law, in particular under Article 101 TFEU, a practice can (i) be restrictive 'by object'; (ii) be restrictive 'by effect'; or (iii) be neither and thus fall outside of the prohibition on restrictive agreements.⁵⁷ Note, however, that both EU competition law on unilateral conduct (Article 102 TFEU)⁵⁸ and U.S. antitrust law⁵⁹ operate based on similar categorizations. The main difference between categories (i) and (ii) is the respective prominence of formal qualification vs effects analysis in determining the conduct's legality.

This section divides scenarios of ecosystem entanglement in the above categories. In doing so, it provides preliminary guidance for testing the legality of ecosystem entanglement, while also getting a firmer grip on its effects and showing where the gaps in the framework are.

3.1. Restrictive By Object Under Article 101 TFEU

Coordination between firms is restrictive by object when it reveals 'a sufficient degree of harm to competition'.⁶⁰ The starting point to operationalize this rather broad and descriptive formula is to identify the rationale or aim behind the coordination, i.e., what it—objectively

2007) <<https://news.microsoft.com/speeches/kevin-johnson-facebook-and-microsoft-expand-strategic-alliance-conference/>>.

⁵⁶ Commentators have speculated that Microsoft wanted to keep Apple alive so that it did not look like an absolute monopolist in the desktop PC market.

⁵⁷ See, e.g., European Commission, 'Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements' (Communication) C/2023/4752.

⁵⁸ Under Article 102 TFEU, conduct can (i) be presumed to lead to exclusionary effects; (ii) require a demonstration of its capability to produce exclusionary effects; or (iii) fall outside of the prohibition of abuse of dominance/be *per se* legal. See European Commission, 'Guidelines on the application of Article 102 of the Treaty on the Functioning of the European Union to abusive exclusionary conduct by dominant undertakings' (Draft Communication, 2024), para 60.

⁵⁹ In U.S. antitrust law, conduct can broadly be (i) (quasi-) *per se* illegal; (ii) subject to the rule of reason; or (iii) *per se* legal, with further nuances to the burden-shifting framework for (specific forms of) collusion and monopolization. See Gregory Werden, *The Foundations of Antitrust* (Carolina Academic Press 2020), Chapters 21–22.

⁶⁰ Case C-67/13 P, *Groupement des cartes bancaires v Commission*, EU:C:2014:2204, para 49.

speaking—seeks to achieve.⁶¹ If the aim is inherently (‘by its very nature’) harmful to the proper functioning of competition, it is considered restrictive by object.⁶² This is the case for collusion, where parties ‘substitute practical cooperation between them for competition and the risks that that entails’.⁶³ Determining whether there is such collusion is, however, not an entirely formal exercise;⁶⁴ regard must always be had to the economic and legal context.⁶⁵

Fixing prices and dividing markets are typical examples by object restrictions. One can think here of Microsoft’s market division proposal to Netscape in 1995, according to which Netscape could develop its browser for OSs *other than* Windows 95, where Microsoft’s own Internet Explorer would reign supreme.⁶⁶ In return, Netscape would benefit from preferential treatment (a ‘special relationship’) in developing solutions on top of Internet Explorer. Microsoft would also take equity in Netscape, along with a board seat. But Microsoft’s proposal is an unusually blatant example of attempted ecosystem entanglement. And the proposed relationship is tilted strongly in Microsoft’s favour, which is explained by the alternative it put on the table: for Netscape to be ‘crushed’.⁶⁷

For a more realistic model of objectively restrictive ecosystem entanglement, one can look to the pay-for-delay agreements known from the pharmaceutical sector.⁶⁸ According to such agreements, originator drug manufacturers pay generic drug manufacturers to settle a patent dispute (hence the alternative name ‘reverse payment patent settlements’). If the payment, monetary or in kind, is sufficiently large to act as an incentive for the generic manufacturer to refrain from entering the market, it is restrictive by object.⁶⁹ In such cases, the originator manufacturer is essentially buying off potential competition.

Economically, the idea of a pay-for-delay scheme—the reason why they work—is that a generic manufacturer’s share of the monopoly profit is greater than the profit it expects from competing. This collusive mechanism is equally found in ecosystem entanglement (see above, Section 2). In entanglement scenarios, the payment can be monetary, generally in the form

⁶¹ See Pablo Ibáñez Colomo, ‘Restrictions By Object Under Article 101(1) TFEU: From Dark Art to Administrable Framework’ (2024) 43 Yearbook of European Law (advance access), on which this section relies more generally. Subjective intention can also be taken into account, see *ibid*, para 54.

⁶² *Groupement des cartes bancaires* (n X), para 50.

⁶³ Case C-8/08, *T-Mobile Netherlands et al v Raad van bestuur van de Nederlandse Mededingingsautoriteit*, EU:C:2009:343, para 59.

⁶⁴ Though qualification is key, see Case C-307/18, *Generics (UK) Ltd et al. v Competition and Markets Authority*, EU:C:2020:52, para 65 (on how, concerning restrictions by object, ‘all that is required is the demonstration that they can in fact be classified as “restrictions by object”’).

⁶⁵ *Groupement des cartes bancaires* (n X), para 53.

⁶⁶ Department of Justice, Proposed Findings of Fact in *U.S. v. Microsoft*, Section IV.A, available at <<https://www.justice.gov/sites/default/files/atr/legacy/2006/04/10/2613d.pdf>>. For Microsoft’s response, see ‘Statement by Microsoft Corporation’ (28 July 1998) <<https://news.microsoft.com/1998/07/28/statement-by-microsoft-corporation/>>.

⁶⁷ Netscape hardly orchestrated an ecosystem at the time; it was more of a complementor to Microsoft’s ecosystem, even if Microsoft did view Netscape’s browser as a middleware threat to its OS monopoly.

⁶⁸ See Case C-307/18, *Generics (UK) Ltd et al. v Competition and Markets Authority*, EU:C:2020:52 and Case C-591/16 P, *H. Lundbeck A/S and Lundbeck Ltd v Commission*, EU:C:2021:243.

⁶⁹ Case C-307/18, *Generics (UK) Ltd et al. v Competition and Markets Authority*, EU:C:2020:52, paras 90–95 (in a first step, it must be assessed whether the payment is justified by a legitimate *quid pro quo* or claims waiver).

of a revenue share. Google's payments to Apple (and other device makers)⁷⁰ in return for exclusive default placement is an example.⁷¹ The payment can also be in kind, e.g., in the form of privileged treatment in the rival ecosystem. A potential example is the Google–Meta 'Jedi Blue' deal. According to investigations and complaints, Meta was about to throw its weight behind Header Bidding, an ad technology that posed a competitive threat to Google. That did not end up happening, as Google offered Meta favorable treatment in its ad auction (fee discounts, timing advantage, etc.). However, investigations in Europe were closed based on administrative prioritization,⁷² while a U.S. claim was thrown out.⁷³

3.2. Restrictive By Effect Under Article 101 TFEU

If the coordination does not seek to achieve an objectively anticompetitive aim, an effects analysis is called for. This is particularly the case for productive joint ventures.⁷⁴ The starting point should be that the parties to the joint venture show that its aim is indeed productive, e.g., because it achieves efficiencies (a new or improved product, lower costs) that neither party could attain by themselves. At that point, the authority should examine whether there are no anticompetitive effects. If there are, they have to be weighed against the efficiencies.⁷⁵

A comparison between two joint ventures in the search market is instructive. As Yahoo!'s position in search was declining, it sought a technology partner so that it could remain competitive. There were only two options: Google and Microsoft. Yahoo! first approached Google, arranging for the latter to both provide Yahoo!'s search results and sell ads on search results pages. At the time, Google was already the dominant search and ad platform, and Yahoo! was still its most significant competitor in both markets. The arrangement would reduce if not eliminate Yahoo's incentive to invest, particularly in search advertising. After agency opposition, the parties abandoned the deal.⁷⁶

⁷⁰ The EU case focused only on those other device makers, see Case T-604/18, *Google LLC and Alphabet, Inc. v Commission*, EU:T:2022:541.

⁷¹ In assessing exclusivity agreements, it makes sense to consider their coverage as part of the economic and legal context, as is done in unilateral conduct cases, see *ibid* and *United States et al. v. Google LLC* (n X).

⁷² *Google–Facebook (Open Bidding) agreement* (Case AT.40774) (19 December 2022 closure of proceedings); Competition & Markets Authority, 'Investigation into suspected anti-competitive agreement between Google and Meta and behaviour by Google in relation to header bidding' (10 March 2023 closure of proceedings) <<https://www.gov.uk/cma-cases/investigation-into-suspected-anti-competitive-agreement-between-google-and-meta-and-behaviour-by-google-in-relation-to-header-bidding>>.

⁷³ Case No. 21-cv-6841 (PKC), *State of Texas et al v Google LLC* (D.S.D.N.Y. 2022) 20–34 (applying the rule of reason, not the *per se* rule).

⁷⁴ Substantively, a joint venture is assessed under either Article 101 TFEU or the EU Merger Regulation depending on whether it is cooperative or concentrative, see Council Regulation (EC) No 139/2004 on the control of concentrations between undertakings [2004] OJ L24/1, art 2 (4)–(5) and Sandra Marco Colino, *Competition Law of the EU and the UK* (Oxford University Press 2019) 461–462. Clearly distinguishing between horizontal agreements between unrelated firms vs firms in a productive business relationship, under U.S. antitrust law, see Einer Elhauge and Damien Geradin, *Global Antitrust Law and Economics* (Foundation Press 2018) 86–87.

⁷⁵ One can put this burden of weighing either on the authority (or plaintiff) or on the parties to the joint venture (defendants).

⁷⁶ Department of Justice, 'Yahoo! Inc. and Google Inc. Abandon Their Advertising Agreement' (press release, 5 November 2008) <<https://www.justice.gov/archive/opa/pr/2008/November/08-at-981.html>>.

A subsequent deal with Microsoft survived scrutiny.⁷⁷ As in the Google deal, Yahoo! would exclusively use its partner's search and ad platform. But the arrangement in this case was mutually beneficial beyond money changing hands: Microsoft would acquire Yahoo!'s core search and ad technologies, along with personnel, to improve its platforms. Further, Yahoo! queries would increase Microsoft's scale in search, which is crucial to improve its engine's performance. As a result, Microsoft could become a stronger competitor to Google, which had meanwhile become a quasi-monopolist.

Both joint ventures would be productive, but their distinct effects on competition makes it sensible to prohibit one and allow the other. Entanglement need not be productive, however. Cross-ownership, where one ecosystem holds a minority stake in another, can be purely financial. Given that such cross-ownership lacks the integrative efficiencies that a joint venture (or merger) can entail, they invite greater skepticism.⁷⁸ The risk is that, while producing little value, they soften the incentives to compete of both parties.⁷⁹ An ecosystem could, for example, use such an investment in a smaller player to steer the latter away from disrupting its core platform.⁸⁰ The generative artificial intelligence space, with its many investments/partnerships, is one to watch for financial ecosystem entanglement.⁸¹ The UK Competition & Markets Authority has warned of 'the possibility that incumbent firms may try to use partnerships and investments to quash competitive threats'.⁸² Indeed, what allows OpenAI to develop a search engine may be the fact that Google is not an investor.⁸³ At the same time, investment can come in the form of much-needed inputs (in particular compute, via the cloud or chips directly), in which case an assessment as productive joint venture may be more appropriate.⁸⁴

⁷⁷ *Microsoft/Yahoo! Search Business* (Case COMP/M.5727) Commission Decision of 18 February 2010 (assessing the joint venture as a concentration); Department of Justice, 'Statement of the Antitrust Division on Its Decision to Close Its Investigation of the Internet Search and Paid Search Advertising Agreement Between Microsoft Corporation and Yahoo! Inc.' (press release, 18 February 2010) <<https://www.justice.gov/opa/pr/statement-department-justice-antitrust-division-its-decision-close-its-investigation-internet>>.

⁷⁸ Einer Elhauge, 'Horizontal Shareholding' (2015) 129 *Harvard Law Review* 1267, 1303–1304. This was recognized in the previous version of the U.S. Merger Guidelines, see U.S. Department of Justice and the Federal Trade Commission, *Horizontal Merger Guidelines* (2010), §13 ('partial acquisitions usually do not enable many of the types of efficiencies associated with mergers').

⁷⁹ See Department of Justice and the Federal Trade Commission, *Horizontal Merger Guidelines* (2023), Section 2.11.

⁸⁰ See in that sense Mark Lemley and Matthew Wansley, 'Coopting Disruption' (2024) *Stanford Law and Economics Olin Working Paper No. 589*, available at <<https://ssrn.com/abstract=4713845>>.

⁸¹ Competition & Markets Authority, 'AI Foundation Models: Update Paper' (2024), Figure 5.

⁸² *Ibid*, para 44.

⁸³ OpenAI, 'Introducing ChatGPT Search' (press release, 31 October 2024) <<https://openai.com/index/introducing-chatgpt-search/>>.

⁸⁴ The issue of interlocking directorates, which is closely related to minority shareholding, also deserves scrutiny, potentially as by object restriction given its apparent lack of procompetitive justification, see generally OECD, 'Antitrust Issues Involving Minority Shareholding and Interlocking Directorates' (Competition Policy Roundtable) DAF/COMP(2008)30.

3.3. Not Covered by Article 101 TFEU

The most difficult scenario is where there are no agreements privileging another ecosystem's complement, establishing joint ventures, or channeling investments; one ecosystem simply provides a complement to another ecosystem. In certain such scenarios, for example if that complement is indispensable to the other ecosystem, the implicit threat of its withdrawal may suffice to prevent competitive moves by the other ecosystem. This type of entanglement between ecosystems would escape the grasp of competition law (it is a version of the well-known 'oligopoly problem').⁸⁵ One would have to prove that some underlying agreement is 'only plausible explanation for such conduct'—an evidentiary bar almost impossible to clear.⁸⁶ It must be said, however, that potential examples of this scenario do not spring to mind.

4. Enemy Remedies

The previous section has provided a to-be-finetuned framework to assess ecosystem entanglement. But the most difficult question, as often in antitrust enforcement,⁸⁷ concerns remedies: how do we effectively resolve ecosystem entanglement? A high-level answer immediately presents itself: if the competitive problem is ecosystems being too friendly with each other, the remedy should set them up as enemies. Hence, this section explores 'enemy remedies',⁸⁸ first in the DMA and then in competition law.

4.1. Lack of Enemy Remedies in the DMA

Tackling ecosystem entanglement is crucial to the DMA's success: gatekeepers are each other's most capable challengers, but entanglement between their ecosystems prevents competition (see above, Section 1). And the DMA is first and foremost a remedial tool: its obligations must be understood as *ex ante* remedies rather than *ex post* competition rules.⁸⁹ For example, the DMA does not prohibit gatekeepers from tying their web browser, search engine and virtual assistant to their OS. It skips that step and immediately imposes a remedy, obliging OS gatekeepers to show choice screens for those three apps.⁹⁰

The DMA's remedies are, however, confined to the gatekeepers' respective ecosystems. In other words, the DMA regulates multi-product ecosystems *internally*; it does not regulate the

⁸⁵ See Nicolas Petit, 'The Oligopoly Problem in EU Competition Law' in Ioannis Lianos and Damien Geradin (eds), *Handbook on European Competition Law: Substantive Aspects* (Edward Elgar 2013).

⁸⁶ See, by analogy, Joined cases C-89/85, C-104/85, C-114/85, C-116/85, C-117/85 and C-125/85 to C-129/85, *A. Ahlström Osakeyhtiö and others v. Commission ('Wood Pulp II')*, EU:C:1993:120, para 71.

⁸⁷ Friso Bostoen and David van Wamel, 'Antitrust remedies: from caution to creativity' (2023) 14 *Journal of European Competition Law & Practice* 540.

⁸⁸ The term 'enemy remedies' is taken from Ben Thompson, 'Friendly Google and Enemy Remedies' (*Stratechery*, 6 August 2024) <<https://stratechery.com/2024/friendly-google-and-enemy-remedies/>>.

⁸⁹ See Friso Bostoen and David van Wamel, 'The Digital Markets Act: A Partial Solution to Antitrust's Remedy Problem' (2024) 61 *Common Market Law Review* 1575, Section 2.

⁹⁰ DMA, art 6(3).

external relations between ecosystems.⁹¹ This is clearly visible in the choice screen obligation: An OS gatekeeper is forced to show a choice screen *only* if it is also designated as gatekeeper in the CPS in question. Hence, as its own Safari is designated, Apple needs to show a browser choice screen in iOS.⁹² But as Apple has relied on Google Search, it does not have a proper gatekeeper search engine, let alone a designated one—as a result, it need not show a search engine choice screen. Apple is now partnering with other ecosystem orchestrators (OpenAI, Google) to provide AI agents.⁹³ If those agents, rather than its own, end up amassing users, it will not have to show a virtual assistant choice screen either.⁹⁴ Thus, even though the DMA creates competitive opportunities for other gatekeepers, its within-ecosystem focus prevents it from setting those gatekeepers up as enemies.

There are broadly three options to resolve the DMA's lack of remedies against ecosystem entanglement. First, lawmakers could amend the DMA. They could either adapt specific obligations, or they could include a general provision holding that—under certain conditions (e.g., default placement)—a complement from an entangled ecosystem is considered the gatekeeper's own for the purpose of the obligations. Second, the European Commission (EC) could shift enforcement away from compliance that (also) benefits other gatekeepers towards compliance that fully fosters disruptive startups.⁹⁵ This is not in the text of the DMA; in fact, the absence of a provision excluding gatekeepers as beneficiaries (as in the Data Act) suggests an openness to inter-gatekeeper contestability (see above, Section 1). But a shift towards non-gatekeepers would not be *contra legem* either. It may even align with the DMA's spirit. In that sense, the General Court has held that the regulation is meant to 'ensure the contestability of the position of gatekeepers not only by other gatekeepers but also, or even especially, by other operators which are not gatekeepers for a given CPS.'⁹⁶ Third, one could instead look to antitrust law for enemy remedies.

4.2. Enemy Remedies in Antitrust Law

Choice screens have been the EC's antitrust remedy of choice in digital markets (*Microsoft II*, *Google Android*).⁹⁷ They are also part of the Department of Justice (DOJ)'s proposed remedies

⁹¹ See similarly Alissa Cooper, Jasper van den Boom and Zander Arnao, 'Considerations for Effective Search Competition Remedies' (KGI Working Report, November 2024) 10 (on how the DMA 'does little to address the exclusionary distribution deals at the heart of *US v. Google*').

⁹² See <<https://developer.apple.com/support/browser-choice-screen/>>.

⁹³ 'OpenAI and Apple announce partnership to integrate ChatGPT into Apple experiences' (*OpenAI*, 10 June 2024) <<https://openai.com/index/openai-and-apple-announce-partnership/>>; Mark Gurman, 'Apple Is in Talks to Let Google Gemini Power iPhone AI Features' (*Bloomberg*, 18 March 2024) <<https://www.bloomberg.com/news/articles/2024-03-18/apple-in-talks-to-license-google-gemini-for-iphone-ios-18-generative-ai-tools>>.

⁹⁴ See Friso Bostoen and Jan Krämer, 'AI Agents and Ecosystems Contestability' (CERRE Issue Paper, November 2024), Section 5.2.

⁹⁵ This would have the side effect of making competition between ecosystems that have been disentangled (via antitrust law, see Section 4.2 below) more difficult.

⁹⁶ Case T-1077/23, *Bytedance v Commission*, EU:T:2024:478, para 307.

⁹⁷ *Microsoft (Tying)* (Case AT.39530) Commission Decision of 16 December 2009; *Google Android* (Case AT.40099) Commission Decision of 18 July 2018.

in *U.S. v Google*.⁹⁸ As choice screens reinsert choice that the monopolist denied to consumers, they have intuitive appeal. Their results, however, have been minimal.⁹⁹ There is certainly room for improvement in their design,¹⁰⁰ but—from their current starting point—a very large leap would be necessary to bring meaningful contestability. Moreover, a choice screen's dispersion of consumers over many different services is not necessarily welfare-improving in markets that rely on scale for quality, such as search engines.¹⁰¹

There is an additional problem with choice screens: due to the way in which cases have been brought, they cannot be shown where it would matter most. Compare the EC and DOJ cases against Google. Both were concerned with how Google ensures default placement of its search engine. The EU case focused only on agreements with phone makers that integrated Android OS, such as Samsung—not with Apple.¹⁰² The EC may have made that choice by thinking ahead to the remedy:¹⁰³ it could force Google to show a choice screen on Samsung phones, due to its control over Android,¹⁰⁴ but not on iPhones. The U.S. case, by contrast, did cover the agreement with Apple. But the agreement was assessed as unilateral conduct by Google. As Apple is not a party to the case, it cannot be burdened with a remedy.¹⁰⁵ Hence, in its remedy proposal, the DOJ limited the choice screen to Google browsers (Chrome).¹⁰⁶ To deliver a choice screen where it would matter most, that is, on iPhones, agencies would have to bring a collusion case, as suggested above (Section 3).

Given the various limitations of choice screens, they are unlikely to shake things up. It may thus be worthwhile to abandon them in favor of enemy remedies, which are intended to disrupt. Their purpose is essentially to spur the kind of competition seen in the Apple–Google mapping battle discussed above (Section 2). In short, Google degraded the quality

⁹⁸ Executive Summary of Plaintiffs' Proposed Final Judgment (PFJ) in Case 1:20-cv-03010-APM, *United States et al. v. Google, LLC* (D.D.C. 2024) 11.

⁹⁹ For an overview, see Omar Vasquez Duque, 'Taking Behavioral Antitrust Seriously: On Default Agreements as Exclusive Dealing and the Debiasing Potential of Default Randomization' (2024) 84 *Maryland Law Review* 143, 191–197.

¹⁰⁰ See, e.g., BEUC, 'An Effective Choice Screen Under the Digital Markets Act' (Recommendations, 2023).

¹⁰¹ This can theoretically be addressed by an obligation for search engines to share query data so that competitors can improve their quality, as found in DMA, art 6(11).

¹⁰² *Google Android* (n X).

¹⁰³ A good practice when starting a case, see Thomas Barnett, 'Section 2 Remedies: What To Do After Catching The Tiger By The Tail' (American Bar Association Conference on Monopolization Remedies, Charlottesville, Virginia, 4 June 2008) <<https://www.justice.gov/atr/speech/section-2-remedies-what-do-after-catching-tiger-tail>> ('the remedy issue warrants careful thought up front').

¹⁰⁴ See *Samsung – Web Browsers* (Case DMA.100038) Commission Decision of 5 September 2023, para 48 (on how 'Samsung does not provide nor control Google Android' and it is therefore Google, not Samsung, that can display choice screens).

¹⁰⁵ For an argument from Apple in that sense, see Appendix V: Assessment of Pro-Competition Interventions in General Search to Competition & Markets Authority, 'Online platforms and digital advertising' (n X), para 16 ('Apple also submitted that there is no basis for an intervention involving web browsers or device manufacturers, such as Apple, as it would have the effect of punishing Apple despite the CMA not accusing it of behaving anticompetitively.').

¹⁰⁶ PFJ in *United States et al. v. Google, LLC* (n X) 11 ('display a choice screen on every new and existing instance of a Google browser where the user has not previously affirmatively selected a default general search engine'). Such a choice screen did lead to consumer switching in Russia, see Exhibit No. UPX0170, available at <<https://www.justice.gov/atr/us-and-plaintiff-states-v-google-llc-2020-trial-exhibits>>. But the local market conditions are unique, with a strong competitor in the Russian Yandex.

of Google Maps on iOS by not making available critical features, after which Apple launched its own Apple Maps in 2012. Two years after Apple dropped Google Maps as a default, Google regained only 40% of its iOS traffic.¹⁰⁷ It was a painful process for Apple too but, aided by a strong distribution advantage, its maps app eventually became capable and competitive.¹⁰⁸ This is the kind of competition we want to see: entry into new markets, with the positive side effect of strengthening competition between entire ecosystems (Android vs iOS).

While it is helpful to have clear view of what a remedy is intended to achieve, the question remains how to do so through remedies. A preliminary step is to frame ecosystem entanglement as (also) an issue of collusion. This means that the relevant parties can be subject to remedies; equally importantly, it leaves other parties alone to prevent collateral damage. In *U.S. v Google*, it means both Google and Apple are in,¹⁰⁹ but Mozilla is out. This is important, as Google's revenue share payment to Mozilla for default placement in Firefox (\$400 million in 2021) represents over 80% of the latter's operating budget.¹¹⁰ Any other default payment would likely be half, and perhaps even lower, if Mozilla could not contract with Google.¹¹¹ As a result, Firefox would become a weaker competitor or may even have to leave the already concentrated browser market—a result that would benefit no one.¹¹²

When focusing then on the entangled parties, the first, obvious step is to disentangle them, so to prohibit any agreements privileging complements between them. That is unlikely to be enough to restore competition. In situations where the ecosystem that previously hosted another's complement is the most capable challenger in that complementary market, as with Apple in search, an extra push might be required. Without such a push, the ecosystem could just contract with another complementor. In case Apple contracts with Microsoft for the default placement of Bing, it could still earn 50% of its previous revenue share.¹¹³ Hence, it may be necessary to prohibit the ecosystem orchestrator from contracting with regard to the

¹⁰⁷ Leah Nylen, 'Google Lost Map Traffic with Apple Maps Switch on iPhones, Executive Says' (*Bloomberg*, 20 September 2023) <<https://news.bloomberglaw.com/antitrust/google-lost-map-users-with-apples-iphone-switch-executive-says>>. The original exhibit, in which the exact percentage is redacted, is No. UPX0097, available at <<https://www.justice.gov/atr/us-and-plaintiff-states-v-google-llc-2020-trial-exhibits>>.

¹⁰⁸ Jay Peters, 'Apple Maps turns 10—and it's finally worth using' (*The Verge*, 2 September 2022) <<https://www.theverge.com/23323550/>>.

¹⁰⁹ Other phone makers are also in but, given that Google controls the Android OS they integrate, they could be in even when the case is conceived as unilateral.

¹¹⁰ *United States et al. v. Google, LLC* (n X), para 335.

¹¹¹ *Ibid*, paras 321–329 give insight into how much browsers would lose if they could not contract with Google and would instead go with Microsoft (Bing). For Apple, the revenue share halved (with some variation between projections). If the number of search engine firms competing for the contract went from two (Google and Microsoft) to one, the remaining firm may not pay anything for default status given the lack of alternatives.

¹¹² *Ibid*, para 335 ('Mozilla has repeatedly made clear that without these payments, it would not be able to function as it does today'). Perhaps with that scenario in mind, even search engines support Google's payments to smaller browsers, see Appendix V (n X), para 21 (on DuckDuckGo's support for excluding Firefox and others from any intervention into defaults).

¹¹³ See fn X above.

specific complement (a search engine) *entirely*,¹¹⁴ in which case it has a strong incentive to create and monetize its own complement.

Competition with regard to complements should increase competition between previously entangled ecosystems—make enemies out of friends. Divestitures could also increase the number of enemies. If Google were forced to spin-off Android, in particular, this might lead to an additional ecosystem, at least if Google is not prohibited from re-entering the OS market. It might also lead to a new search engine from the Android spin-off, especially if the spin-off is prohibited from contracting with Google for default search placement. In this way, the divestiture increases competition in the complements market as well, though again there could not be any line-of-business restrictions preventing the spin-off from entering the search market.¹¹⁵

There are two general counter arguments to the implementation of enemy remedies, which are designed to spur competition between ecosystems starting with their complements. The first is that, if successful, we end up strengthening ecosystems, which will provide more of their own complements (e.g., Apple adds a search engine to its multi-product ecosystem). This is indeed a potential or even likely consequence. It is, however, a reasonable trade-off: actual competition between ecosystems and in the complement in question should more than offset the negative consequences of an ecosystem growing another limb.

The second counter argument is that the ecosystems will not start competing, even when agencies try to set them up as enemies. In that sense, an Apple executive has rejected the assumption that ‘without a revenue sharing agreement or other commercial terms with Google, Apple would develop its own search engine’.¹¹⁶ The argument appears self-serving. Internally, Google likely gave a more honest assessment when it wrote that it is really the revenue share that holds Apple back from launching a search product.¹¹⁷ It does indeed seem logical that, if the most profitable substitute to a Google search deal is to build a proper search engine, Apple would choose that course of action. In a second-best scenario, and insofar as the remedy allows it, Apple could end up partnering with Microsoft to prop up

¹¹⁴ As creating a search engine would take time, and the lack of any search engine (on the phone’s different access points) would be problematic, especially for unsophisticated users, a transitional arrangement may have to be made.

¹¹⁵ Several remedy proposals do recommend such line-of-business restrictions, see Fiona Scott Morton et al, ‘Judicial Remedies To Restore Competition in the Market for General Search’ (2024) Yale Tobin Center for Economic Policy Policy Discussion Paper No. 10, 15 and Alissa Cooper, Jasper van den Boom and Zander Arnao (n X) 15–18. There may be a case for line-of-business restrictions in the short term, to prevent the the spin-off or even Google itself to be wiped off the map by an aggressive move by its sibling (every culture’s mythology has a story about fratricide for a reason). However, given that developing an OS/search engine would take some time, that scenario seems unlikely.

¹¹⁶ Declaration of Eddy Cue (Document #1111, Attachment #1) in *United States et al. v. Google, LLC* (n X), available at <<https://www.courtlistener.com/docket/18552824/1111/1/united-states-of-america-v-google-llc/>>. The proffered reasons are that Apple does not want to be distracted from other growth areas, AI developments make any investment risky, and selling targeted ads is not the firm’s core business.

¹¹⁷ Exhibit C (previously filed as Dkt. 660-3) in *United States et al. v. Google, LLC* (n X), available at <https://storage.courtlistener.com/recap/gov.uscourts.vaed.533508/gov.uscourts.vaed.533508.1132.3_1.pdf> (‘We believe Apple is unlikely to give up search TAC [revenue share] for a \$10-\$20b Spotlight Search [Apple’s potential search engine] opportunity, unless regulation or Google disrupts the status quo’).

Bing, which would also turn the search engine market into a duopoly rather than the current quasi-monopoly plus also-ran configuration.¹¹⁸

5. Conclusion

This paper has argued that ecosystem entanglement is an important reason that we are seeing lessened competition between the major platforms. The entanglement often originates in one ecosystem providing a major complement for another (e.g., Google Search in iOS), but can also come in the form of a joint venture or investment. Entanglement softens competition, both in the market for the specific complement and between ecosystems, in particular by rewarding one orchestrator for not encroaching on the other's turf.

Entanglement poses a significant challenge to the DMA, which seeks to make core platform markets more contestable. When the major platforms—theoretically each other's strongest challengers—refuse to compete, that goal becomes elusive. But the DMA itself can do little to remedy entanglement: it regulates relations within ecosystems (between orchestrators and complementors), not between ecosystems.

Antitrust law can fill the gap to some extent, but enforcement agencies would need to do two things. First, when assessing relations between ecosystems, they need to take the perspective of collusion. The mechanism underlying entanglement is often a collusive one: the sharing of monopoly profits rather than competing for a share of the duopoly profits. Second, agencies need to adopt enemy remedies, which are specifically designed to get ecosystems to compete with each other by making it the only or most profitable option.

We have seen exemplary episodes of ecosystem competition before, such as when Apple ditched Google Maps in favour of Apple Maps, at once increasing rivalry in maps and OSs. This is the type of disentanglement that antitrust must pursue. In a case like *Google v U.S.*, that would mean imposing a remedy also on Apple, specifically not to conclude a revenue-sharing agreement with *any* search provider.

¹¹⁸ On how 'competitive oligopoly' is a better market structure for search than monopoly, see Cédric Argenton and Jens Prüfer, 'Search Engine Competition with Network Externalities' (2012) 8 *Journal of Competition Law & Economics* 73.