TRANSFORMING THE PILE OF JUNK: A MODEL FOR CROSS-COMPETITIVE NEGATIVE KNOWLEDGE SHARING

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ABSTRACT

Trade secret protection for negative knowledge stifles innovation by limiting employee mobility, undercutting the general skills and knowledge rule, and working against traditional trade secret rationales. However, information-sharing networks may increase the pace of innovation by encouraging the free flow of information across competitive boundaries. The proposed model is a contract-based, private market alternative to negative knowledge trade secret disputes, which mitigates the problems with negative knowledge trade secret protection without requiring a change in existing trade secret law. Under the proposed model, industry groups working towards known solutions to known problems share negative knowledge with other group members. This information sharing leads to more industry efficiency through less repetition of competitor mistakes. Furthermore, the model increases follow-on innovation by creating a knowledge base of failed research paths. Moreover, the resulting increase in employee mobility between competitors serves to boost industry innovation. While free-riding and information misuse pose potentially

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potent threats to the success of the model, both threats are avoided through careful drafting of the contract and through the role of a governing central body. Antitrust concerns are also addressed by ensuring that the cooperation remains procompetitive in nature. Overall, implementation of the proposed model may increase the pace of innovation in qualifying industries, benefiting both the industry and society.

I. INTRODUCTION

The source of innovation is hotly debated and heavily studied. Innovation drives economies and promotes prosperity. Thus, the promotion of innovation is critical. But how is innovation encouraged? What is the source of invention? Thomas Edison famously said, "to invent, you need a good imagination and a pile of junk."[1] While much scholarly debate focuses on protecting invention and fostering imagination, this Article will take a different approach: providing a useable pile of junk.

The pile of junk here is the body of abandoned research, failed experiments, and non-working iterations that exist anywhere a successful technology has been developed. Currently, that pile of junk is protectable under the theory of "negative knowledge" trade secrets. However, since it is protected and kept secret, it is inaccessible to the very engineers and researchers capable of transforming it.

This Article proposes a model for sharing negative knowledge trade secrets across competitive boundaries as a means of increasing innovative output in certain high-tech industries. The proposed model is not a rejection of legal protection for negative knowledge trade secrets. Instead, it is a contract-based, private market alternative to negative knowledge trade secret disputes that builds on the existing legal framework of both statutory and common law negative trade secret protection.

Part II outlines the law and theoretical basis of negative knowledge and also discusses common criticisms

[1] HARPERCOLLINS, COLLINS QUOTATION FINDER 359 (1999) (attributing quote to Thomas Edison).

and issues with the legal protection of such trade secrets. Part III discusses the innovation-boosting effects of information-sharing networks through several historical examples spanning the industrial revolution and the explosion of open-source software. Part IV combines the lessons learned from information-sharing networks and the issues with negative knowledge protection to propose a model for negative knowledge sharing across competitive boundaries.

II. THE LAW OF NEGATIVE KNOWLEDGE

An engineer works on a project for Acme Corporation, and in the course of his work helps design a new top-secret process for manufacturing widgets. Because of the secret process the engineer helped develop, Acme can sell its widgets for a much lower price than its competition, thereby overtaking the competition as the dominant widget manufacturer. Clearly, the widget manufacturing process is highly valuable to Acme, and maintaining its secrecy is critical to Acme's success in the market. The process is, therefore, a legally-protectable trade secret. The engineer cannot reveal the trade secret to the competitor without the engineer and competitor facing substantial legal action. The competitor may hire the engineer, but the engineer cannot divulge the trade secret so long as its secrecy is protected, and its commercial value maintained.

Now imagine that the engineer, while developing the top-secret process, attempted multiple approaches before discovering the correct solution. Each of these approaches failed, and the engineer had to course-correct and take a different path. While it is clear that the engineer cannot divulge the actual process, can he ever reveal the failed attempts he made along the path to success?

Certainly, a failed attempt is part of the engineer's experience in the field, and not the property of Acme. Unfortunately, the concept of "negative knowledge" says otherwise. The legal concept of a negative knowledge trade secret, as formalized by the Uniform Trade Secret Act (UTSA), extends legal trade secret protection to knowledge of what *not* to do.[2]

The UTSA defines a trade secret as "information . . . that: derives independent economic value . . . from not being generally known" and that "is the subject of efforts . . . to maintain its secrecy."[3] The comments further specify that "[t]he definition includes information that has commercial value from a negative viewpoint."[4] While the concept of negative knowledge trade secrets was used in the common law prior to its adoption in the UTSA, its inclusion in the comments represents the black letter formalization of the concept, and cements negative knowledge as a recognized part of the legal framework of trade secret protection.[5]

To fully understand the rationales and shortcomings of negative knowledge trade secrets, it is first necessary to understand the legal underpinnings of their "positive" counterparts. A trade secret is any piece of information that has commercial value, is subject to reasonable efforts to maintain its secrecy, and is not generally known or readily ascertainable.[6] While modern trade secret law

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[2] UNIF. TRADE SECRETS ACT § 1 cmt. (UNIF. LAW COMM'N 1985).
[3] *Id.* § 1.
[4] *Id.* § 1 cmt.
[5] Charles Graves, *The Law of Negative Knowledge: A Critique*, 15 TEX. INTELL. PROP. L.J. 387, 394–95 (2007).
[6] ROGER M. MILGRIM, MILGRIM ON TRADE SECRETS § 1.01 (2018); *see* Amir Khoury, *The Case Against the Protection of Negative Trade Secrets: Sisyphus' Entrepreneurship*, 54 IDEA 431, 447 (2014)

derives its theoretical basis in the same constitutional underpinnings as copyright and patent law—that is, the incentivization of innovation and creativity—trade secret law is also based on rationales derived from the need to maintain standards of "commercial ethics" and to discourage unfair competition.[7] Trade secret law is therefore based on both economic and moral justifications; protection of valuable secret information helps to foster innovation and maintain standards of fair competition.[8]

On the surface, negative knowledge trade secrets fit nicely into this framework.[9] Protecting the secrecy of all information gained while pursuing an engineering or scientific breakthrough—not just the final product—may help encourage research. Moreover, that protection may prevent competitors from gaining an unfair advantage. Imagine again the Acme engineer. If he is hired by the competitor, and reveals all of the mistakes, missteps, and failed attempts, then hypothetically, the competitor should be able to independently discover Acme's secret process more quickly than Acme did. Hypothetically, negative knowledge protection is essential to protecting positive trade secrets through its elimination of potential head starts.

However, is negative knowledge trade secret protection an appropriately tailored response to the perceived issue of unfair head starts? Or is negative knowledge protection allowing companies to "pull up the

("[A]ny confidential business information that provides an enterprise with a competitive edge may be considered a trade secret.").

[7] Marrakesh Agreement Establishing the World Trade Organization, Apr. 15, 1994, 1867 U.N.T.S. 154; Kewanee Oil Co. v. Bicron Corp., 416 U.S. 470, 484–85 (1974); Graves, *supra* note 5, at 409.

[8] Deepa Varadarajan, *The Trade Secret-Contact Interface*, 103 IOWA L. REV. 1543, 1550 (2018).

[9] UNIF. TRADE SECRETS ACT § 1 cmt. (UNIF. LAW COMM'N 1985).

ladder behind them" and granting legal rights without properly examining the underlying justification for doing so?

Upon closer examination, legal protection for negative knowledge trade secrets does not fit comfortably within the traditional policy goals that form the foundation of trade secret law.[10] In fact, the theory of negative knowledge has been called "a recipe for stagnation," "the strangest theory of trade secret law," and "conceptually unworkable [serving] mainly as an anticompetitive threat to employee mobility."[11] There are three main criticisms of negative knowledge trade secret protection: that it severely limits employee mobility, that it cuts directly against the general skills and knowledge rule, and that it does not fit within traditional justifications of trade secret law.[12]

The first commonly cited criticism of negative knowledge trade secret law is that it severely limits employee mobility.[13] Part of this mobility-limiting effect comes from the imposition of liability on employees for the disclosure of negative knowledge gained during employment. While at first glance this liability is reasonable, in practice it is unworkable and illogical.[14] To illustrate the issue, consider the definition of trade secret misappropriation:

> (i) acquisition of a trade secret of another by a person who knows or has reason to

[10] Graves, *supra* note 5, at 388.
[11] Graves, *supra* note 5, at 388; Khoury, *supra* note 6, at 449.
[12] Graves, *supra* note 5, at 407.
[13] Graves, *supra* note 5, at 388; ORLY LOBEL, TALENT WANTS TO BE FREE 107–08 (2013).
[14] *See* Graves, *supra* note 5, at 410.

> know that the trade secret was acquired by improper means; or
> (ii) disclosure or use of a trade secret of another without express or implied consent . . . .[15]

Therefore, to misappropriate a negative knowledge trade secret, a new employee must disclose or use the negative knowledge.

The first means of misappropriation is use. However, what is "use" in the negative knowledge context? Must an engineer repeat his past mistakes to avoid "using" his past employer's negative knowledge? And to what extent? Taken to the extreme, an absurd picture emerges. To ensure that she has not used her former employer's negative knowledge, a researcher must not only repeat every past mistake and dead-end research path but do so in a way that takes the same amount of time and costs the same amount of money as her past research.[16] How else can she avoid accusations that she gave her new employer a head start? While this example may be extreme, it does follow the logical structure of the law. Put simply, "the consequence for inventors who move to a new firm can be liability for not repeating past mistakes."[17] The second means of misappropriation is misappropriation by disclosure.

There are two paths to misappropriation by disclosure: actual disclosure, and inevitable disclosure.[18] Actual disclosure is simply disclosing a trade secret.[19] In

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[15] UNIF. TRADE SECRETS ACT § 1(2) (UNIF. LAW COMM'N 1985).
[16] Graves, *supra* note 5, at 411.
[17] LOBEL, *supra* note 13, at 107.
[18] MILGRIM, *supra* note 6, § 1.01.
[19] MILGRIM, *supra* note 6, § 1.05.

the negative context, since actual disclosure would likely involve a competitor avoiding a disclosed mistake—essentially the same result as use—actual disclosure and use in the negative knowledge context are essentially identical.[20] Inevitable disclosure presents a more vexing issue.[21] The inevitable disclosure doctrine, used in some jurisdictions, provides injunctive relief where a departing employee "will 'inevitably' use the owner's trade secret in the new position," even where no enforceable non-compete agreement exists.[22] Coupled with negative knowledge, this doctrine presents a steep, potentially insurmountable barrier to employees: while avoiding disclosure of well-defined, traditional trade secrets is possible, avoiding any use or disclosure of an infinitely more nebulous negative knowledge trade secret is extremely difficult (see use section below), and inevitable disclosure is therefore a potent tool for firms looking to keep their employees from moving.[23]

The existence of negative knowledge trade secrets poses a potent threat to employee mobility.[24] After all, what is the value of hiring an experienced engineer, if all of her specific knowledge is tied up in her former employee's traditional trade secrets, and all of her general experience is

[20] Graves, *supra* note 5, at 397.
[21] Graves, *supra* note 5, at 397.
[22] MILGRIM, *supra* note 6, § 1.01; *see also* LOBEL, *supra* note 13, at 114 ("The inevitable disclosure doctrine alters the employment relationship without advance consent or compensation and changes the ways human capital is valued in the market.").
[23] Graves, *supra* note 5, at 397; s*ee also Avery Dennison Corp. v. Finkle*, No. CV010757706, 2002 Conn. Super. LEXIS 329, at *13 (Conn. Super. Ct. Feb. 1, 2002) (finding that despite the former employer's reasonable efforts to maintain trade secret secrecy, it was "virtually impossible for [the] trade secret information . . . to not affect the employment relationship").
[24] LOBEL, *supra* note 13, at 107.

protected by her former employee's negative knowledge trade secrets? As Edmund Kitch put it, "stripped of the ability to use that knowledge, [seasoned] employees" become nothing more than "freshly-minted (and far cheaper) M.B.A. graduates."[25] Turn once again to the example engineer and the top-secret Acme process. The engineer is later hired by the competitor, in part due to his many years of industry experience. He is tasked with developing a competing process that will help the competitor take back some of the market share it lost to Acme. The engineer is aware, however, of the doctrine of negative knowledge trade secrets, and therefore avoids drawing on any of his experience, gained through years of developing the process for Acme. Why then, did the competitor hire him? If his experience is the property of Acme, then his value in the industry is no greater than that of a recent graduate. In fact, the recent graduate, without any prior work experience, has no concerns from a trade secret misappropriation perspective, and is able to use the full extent of his (albeit limited) experience.

While the above example is extreme, it illustrates the heart of the issue with enforcement of negative knowledge trade secrets. Trade secret law was not created to prevent employees from ever changing jobs, or to grant ownership rights in employees' full body of experience and knowledge to employers. But those controls, as illustrated by the above example, are granted through enforcement of negative knowledge trade secrets. This hypothetical describes the issue that appears when considering negative knowledge protection and its implications for the general skills and knowledge rule.

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[25] Edmund W. Kitch, *The Expansion of Trade Secrecy Protection and the Mobility of Management Employees: A New Problem for the Law*, 47 S.C. L. REV. 659, 665 (1996).

The second criticism of negative knowledge protection is that it undercuts the general skills and knowledge rule. This rule states that an employee's "general skills, knowledge, training, and experience" belong to the employee, and not her employer.[26] The rule stems from a public policy interest in allowing an inventor to use general skills and knowledge learned while working for a prior employer, and still maintain rights to his inventions created using that knowledge.[27] If the general skills and knowledge rule was not enforced by courts, employers could more freely assert ownership rights over inventions of their former employees.[28] The threshold question of what separates general skills and knowledge from an employer's trade secrets is one of the most heavily litigated areas in trade secret law.[29] However, the theory of negative knowledge cuts directly against the general skills and knowledge rule.[30] By allowing companies to claim negative knowledge—the failed results of the trial and error process—as trade secrets, employees' general experience at a company gets enveloped into the company's intellectual property.[31] The purpose of the general skills and knowledge rule is defeated by allowing for negative knowledge protection; if an employee's entire body of knowledge is the property of her prior employer, she has very little value to future employers.

The first two criticisms of negative knowledge protection work to severely limit employee mobility. Under a strong regime of negative knowledge and traditional trade secret protection, employees may be

[26] Graves, *supra* note 5, at 408.
[27] MILGRIM, *supra* note 6, § 5.02(4)(d).
[28] MILGRIM, *supra* note 6, § 5.02.
[29] LOBEL, *supra* note 13, at 107.
[30] Graves, *supra* note 5, at 408.
[31] Graves, *supra* note 5, at 409.

unable to move within an industry. Even absent traditional human capital controls such as non-compete and non-disclosure agreements, trade secret law can be effectively leveraged to prevent employees from moving to competitors, or from leaving to start their own firms.[32] Professor Orly Lobel argues that one of the main reasons for the explosive growth of Silicon Valley is California's employee mobility-focused approach to human capital controls.[33] The economic strength of the Valley as a center for startup innovation is rooted in a belief that a free flow of employees, and the ideas and experience they bring with them, drastically increases the pace of innovation industry wide.[34] If the free flow of information, experience, and knowledge between companies is a strong driver of innovation, than protection of negative knowledge stymies that growth.

The third criticism of negative knowledge protection, that the standard theoretical justification for trade secret law does not justify the protection of negative knowledge, stems from the first two.[35] If negative knowledge protection serves to limit employee mobility by undercutting the general skills and knowledge rule and by creating barriers to employees' use of their work experience, and employee mobility is a major innovation driver, than negative knowledge protection does not increase innovation. Functionally then, negative knowledge does not serve the purposes for which intellectual property is generally protected.

Moreover, from a theoretical standpoint, negative knowledge also fails to fit within traditional Intellectual

[32] LOBEL, *supra* note 13, at 106–07.
[33] LOBEL, *supra* note 13, at 119.
[34] LOBEL, *supra* note 13, at 118–19.
[35] Graves, *supra* note 5, at 407.

Property rationales. Intellectual property law generally serves the two functions of encouraging both invention and dissemination of information.[36] Patents are necessarily published,[37] copyrighted works are deposited in the Library of Congress,[38] and Trademarks are used publicly.[39] While trade secrets seem to buck the trend of encouraging information dissemination, "trade secret law actually encourages broader disclosure and use of information" by reducing the need to invest in security measures and by serving as "a partial solution to Arrow's Information Paradox."[40] This paradox states that when determining demand for information, "its value for the purchaser is not known until he has the information, but then he has in effect acquired it without cost."[41] In practice, trade secret law allows a party to disclose an idea to an interested party prior to the formation of contractual protections.[42] Because of this, trade secret law "permits business negotiations that can lead to commercialization . . . or sale of the idea, serving both the disclosure and incentive functions of IP law."[43] However, protection of negative knowledge does not serve the same purposes. Such protection does not further reduce the need to invest in security measures since such investments would be made before an entity knows whether the produced information will have value as a traditional or as a negative knowledge trade secret. Furthermore, such protection fails to provide the same

[36] Mark A. Lemley, *The Surprising Virtues of Treating Trade Secrets as IP Rights*, 61 STAN. L. REV. 311, 332–33 (2008).
[37] 35 U.S.C. § 122(b) (2012).
[38] 17 U.S.C. § 407 (2012).
[39] 15 U.S.C. § 1127 (2012).
[40] Lemley, *supra* note 36, at 333–34, 336.
[41] Kenneth Arrow, *Economic Welfare and the Allocation of Resources for Invention*, *in* THE RATE AND DIRECTION OF INVENTIVE ACTIVITY: ECONOMIC AND SOCIAL FACTORS 609, 615 (1962).
[42] Lemley, *supra* note 36, at 336–37.
[43] Lemley, *supra* note 36, at 337.

solution to Arrow's information paradox since it is unlikely that negative knowledge would be licensed or sold alone.[44] Taken together, the effective limiting of employee mobility and the failure to serve the same roles as traditional trade secrets show that negative knowledge trade secrets do not fit the theoretical justifications of trade secret law.[45]

Overall, protection for negative knowledge does not fit with any aspect of trade secret law. Negative knowledge trade secrets lack a sound theoretical basis, undercut the general skills and knowledge rule, and, taken to the extreme, force employees into absurd and illogical situations.[46] These criticisms, however, are far from new, and standing alone will not spark change in the legal trade secret landscape. While solutions have been posed that range from amending the UTSA to refusing to enforce negative knowledge trade secrets because of their statutory basis in a comment rather than a section of the UTSA, these solutions are unlikely to be adopted.[47] Rather than changing existing law, a contract-based, industry-specific alternative provides efficiency and results in increased innovation.

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[44] Graves, *supra* note 5, at 408.

[45] A fourth criticism of negative knowledge states that negative knowledge trade secrets fail to stand alone as property, since it is unlikely that negative knowledge would ever be licensed alone. Charles T. Graves, *The Law of Negative Knowledge: A Critique*, 15 TEX. INTELL. PROP. L.J. 387, 408 (2007). However, this criticism is not persuasive because while negative knowledge trade secrets lack a real property analog, the same can be said of other forms of IP. Furthermore, granting legal property rights in intellectual endeavors often serves a greater economic purpose, and, somewhat paradoxically, treating negative knowledge as property allows for the proposed model to function more efficiently.

[46] *See supra,* Part I.

[47] Graves, *supra* note 5, at 413.

III. THE INNOVATION-PROMOTING NATURE OF INFORMATION SHARING

The theoretical foundation of intellectual property law is that control and ownership of information encourage innovation.[48] Both patent law and trade secret law are based on this rationale, but the two achieve the goal of innovation encouragement through opposing means.[49] Patent law encourages innovation by trading strong protection for disclosure. Trade secret law grants protection only to parties who protect themselves and removes that protection where independent invention destroys secrecy.[50] Yet, despite its clearly different approach, trade secret law stands to gain by incorporating some of the lessons learned from patent law.

One of patent law's innovation-encouraging mechanisms is using disclosure as a building block for follow-on innovation.[51] Because a patent includes an enabling disclosure, the publication of a patent application often provides a blueprint for innovators looking to improve upon the invention.[52] As the patent population of an industry becomes denser, patent disclosures provide three critical building blocks for follow-on innovation: a historical roadmap of how a technology developed, a blueprint of where the technology may go next, and a

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[48] DAVID VAVER, INTELLECTUAL PROPERTY LAW 15 (2nd ed., 2011).
[49] *Id.*; Lemley, *supra* note 36, at 336.
[50] PETER S. MENELL ET AL., INTELLECTUAL PROPERTY IN THE NEW TECHNOLOGICAL AGE 2017: VOLUME I: PERSPECTIVES, TRADE SECRETS AND PATENTS 51–52 (2017); VAVER, *supra* note 48.
[51] J.H. Reichman & Jonathan Franklin, *Privately Legislated Intellectual Property Rights: Reconciling Freedom of Contract with Public Good Uses of Information*, 147 U. PA. L. REV. 876, 876–83 (1999).
[52] *Id.*

heatmap of the most researched areas.[53] Trade secret law, on the other hand, provides none of these benefits.[54]

The traditional utilitarian theory of trade secret protection is based on three assumptions.[55] First, "absent trade secret protection, firms will overinvest in self-help measures to preserve secrecy."[56] Second, "lack of trade secret protection . . . incentiviz[es] firms to only selectively disclose information to employees," limiting the ability of intra-firm collaboration.[57] And third, without trade secret protection "firms . . . underinvest in employee training."[58] Utilitarian theory suggests, therefore, that without trade secret protection, companies would lack motivation to innovate.[59] However, several historical examples not only challenge that assumption, but suggest that, where maintaining secrecy is difficult, "some industries will build reciprocal information-sharing innovation networks—rather than higher walls to protect their secrets."[60] From the industrial revolution to the explosion of Silicon Valley, from blast furnaces to open-source software, groups of innovators have consistently shown that in certain conditions, the open sharing of information can increase the innovative output of an entire industry.

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[53] LOBEL, *supra* note 13, at 41.

[54] Since trade secrets are necessarily hidden from public view, there cannot be a published roadmap on which to build follow-on innovation in the trade secret space.

[55] Laura Pedraza-Farina, *Spill Your (Trade) Secrets: Knowledge Networks as Innovation Drivers*, 92 NOTRE DAME L. REV. 1561, 1564 (2017); *see* Lemley, *supra* note 36, at 333–34.

[56] Pedraza-Farina, *supra* note 55; *see* Lemley, *supra* note 36, at 334.

[57] Pedraza-Farina, *supra* note 55; *see* Lemley, *supra* note 36, at 334.

[58] Pedraza-Farina, *supra* note 55; *see* Lemley, *supra* note 36, at 334.

[59] Pedraza-Farina, *supra* note 55.

[60] Pedraza-Farina, *supra* note 55.

The first example of information sharing's ability to increase innovation comes from the industrial revolution, an era where "a subset of industries made breakthrough advances precisely by eschewing trade secret protection."[61] One of those industries was the British iron and steel industry, where a "dramatic" redesign of the blast furnaces used in the industry was developed "through the operation of collective invention."[62] Robert Allen argues that this development, which clearly benefited the industry as a whole, would not have taken place under an "independent inventor" model or a "firm R&D model," simply because the actual innovations were incremental, thus lacking sufficient novelty to be legally protectable.[63] Allen goes on to identify three features of his "collective invention" theory, that allow such information sharing innovations to occur.[64] First, improvements on the blast furnace were incremental in nature. Second, results of the incremental improvements were publicly available. Third, firms that further improved the furnaces did so using the information previously made public.[65] Through this process of information sharing and follow-on invention, cooperation between competitive entities improved the industry as a whole, in a way that traditional IP law protections may not have encouraged.

A second example of collective invention comes from the open-source software movement. By eschewing the modern framework of restrictive license agreements and close control of software distributions, open-source software has become a critical part of modern software

[61] Pedraza-Farina, *supra* note 55, at 1563.
[62] Robert Allen, *Collective Invention*, 4 J. ECON. BEHAV. & ORG. 1, 3 (1983).
[63] *Id.* at 3–4.
[64] *Id.* at 4.
[65] *Id.* at 4–5.

development.[66] Entire suites of software, from basic microprocessor source code to full operating systems, are developed by scores of programmers, working from homes and offices around the world.[67] While open-source software is not a universal solution, its benefits include increased user control, higher stability, and even better security in certain applications.[68] Another benefit is the increased pace of innovation. In the fifteen years since Ubuntu's inception, thirty versions have been updated and released.[69] Compare that with the non-open-source Windows operating system, which, in the same time period, released six major version updates.[70] It is difficult to compare two different and competing operating systems in terms of innovation, but the frequency of major updates suggests that the pace of development of Ubuntu is significantly quicker than that of Windows.

Professors Levine and Prietula have studied the principals and performance of open collaboration and theorize that collaboration between competitors can be a "robust engine for innovation," even in industries with high levels of free-riding, low levels of diversity, and highly

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[66] WHAT IS OPEN SOURCE?, https://opensource.com/resources/what-open-source [https://perma.cc/VKN7-J4V8] (last visited Mar. 28, 2019).

[67] *See* ARDUINO, https://www.arduino.cc [https://perma.cc/K2HN-VZTE] (last visited Mar. 28, 2019); UBUNTU, https://ubuntu.com/community/mission [https://perma.cc/PJ2B-DJJ9] (last visited Mar. 28, 2019).

[68] WHAT IS OPEN SOURCE?, *supra* note 66.

[69] UBUNTU RELEASES, http://releases.ubuntu.com [https://perma.cc/XZ3Q-ELVM] (last visited Mar. 31, 2019); OLD UBUNTU RELEASES, http://old-releases.ubuntu.com/releases [https://perma.cc/S3VM-8QJY] (last visited Mar. 31, 2019).

[70] MICROSOFT WINDOWS VERSION HISTORY, https://en.wikipedia.org/wiki/Microsoft_Windows_version_history [https://perma.cc/4BX7-X4PJ] (last visited Mar. 31, 2019).

rival goods.[71] Levine and Prietula suggest that in qualifying industries, revealing an innovation provides benefits to the sharing party through the diffusion of that innovation.[72] However, these benefits are not the directly competitive advantages one may assume would stem from rival entities publishing their secrets.[73] Instead, open collaboration serves to lower the price of research and development for all players in an industry by "pooling or externalizing" the associated costs.[74] Furthermore, collaboration encourages follow-on innovation by creating larger pools of common knowledge, a framework on which to base further research.[75] While the utilitarian model of trade secret law fails to encourage follow-on innovation, this collaborative approach excels at encouraging providing a basis for such research. Collaborative information sharing networks substantially increase the production of such follow-on innovations.[76]

Principals of open collaboration increase innovation and efficiency in applicable markets because "innovation is a collective endeavor."[77] Based on these principals, it is clear that information sharing networks can provide huge benefits in the form of efficiency and increased innovative output.[78] Professor Lobel summarizes this effect: "[O]ver the long run information leaks and talent spillovers foster new levels of creativity and innovation that benefit not only the best and most fearless companies but also the economy

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[71] Sheen S. Levine & Michael J. Prietula, *Open Collaboration for Innovation: Principles and Performance*, 25 ORG. SCI. 1414, 1414, 1427 (2014).
[72] *Id.* at 1417–18.
[73] *Id.*
[74] *Id.*
[75] *Id.* at 1417.
[76] Pedraza-Farina, *supra* note 55.
[77] LOBEL, *supra* note 13, at 9.
[78] LOBEL, *supra* note 13, at 73.

as a whole."[79] Yet, despite the benefits, it is unlikely that traditional companies will start sharing their trade secrets with their competitors. To do so would be equivalent to corporate suicide. Not only would one company have to go first, to serve as an example, but the effects of a single company engaging in open cooperation and information sharing is unlikely to impact the industry as a whole—and even if it did, the effects may not be quick enough to convince others to join in. Perhaps open collaboration does provide benefits, but the issue facing any industry wishing to enjoy those benefits is a collective action problem: the individual benefits are not enough to outweigh the individual costs.

The solution therefore lies in traditional notions of freedom to contract. Generally, intellectual property law, and trade secret law specifically, provides a set of default rules that parties may contract around.[80] While the extent to which contracting around default rules should be accepted is a matter of ongoing debate, it is generally accepted that contract law plays a significant role in allowing parties to tailor their intellectual property needs to the goals of a specific situation.[81] The argument for extensive use of contract in this way is that "private contracting around the default rules of IP is usually efficiency-maximizing."[82] Therefore, to get around the collective action problem in industries that would benefit from increased collaboration, contract-based, private market options may provide a simple and efficient solution.

[79] Lemley, *supra* note 36, at 39.
[80] Varadarajan, *supra* note 8, at 1576.
[81] Varadarajan, *supra* note 8, at 1544.
[82] Varadarajan, *supra* note 8, at 1576.

IV. THE PROPOSED MODEL

The proposed model is a contractual arrangement (a group) between entities in an industry (group members) whereby the entities agree to share negative knowledge for the benefit of the group. Essentially, at regular intervals, group members submit recently gained negative knowledge to a central body. The central body receives, analyzes, and anonymizes the submitted negative knowledge and publishes a report containing the compiled information to the group members. The model mimics the complex intellectual property cross-licensing agreements found in some industries.[83] By granting access to negative knowledge trade secrets, members essentially license those trade secrets to the group.[84] The above description embodies the necessary elements of the proposed model; since it is a private market solution, entities employing this solution will tailor the contractual arrangement to suit the specific needs of their respective industries. Accordingly, desirable characteristics and suggested controls are outlined below for each part of the proposed model.

A. The Central Body

The central body—the legal entity that creates the group—is the most important defining feature of the model in a given industry. The basic arrangement is simply a contractual agreement between group members. The contract lays out the terms of the agreement, including the frequency of negative knowledge submission and the conditions precedent for submission.[85] The contract also

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[83] ROBERT MERGES, INSTITUTIONS FOR INTELLECTUAL PROPERTY TRANSACTIONS: THE CASE OF PATENT POOLS 3 (1999), available at law.berkeley.edu/files/pools.pdf [https://perma.cc/EE7Y-F5J3].

[84] UNIF. TRADE SECRETS ACT § 1 (UNIF. LAW COMM'N 1985).

[85] *See infra* Section III.B.

governs payment of fees, limitations on the use of the report, and means of enforcing the contract. In this arrangement, the central body is an outside entity hired to carry out the collection of information and the publication of the report. This outside entity is an independent and disinterested firm tasked with collecting, analyzing, anonymizing, and publishing the negative knowledge report.[86] This entity also may play a role in dispute resolution, fee collection, and any third-party interactions with the group. Because the contractual arrangement is the only form of governance of the group, this arrangement requires a clear and well thought out contract and may be better suited to smaller groups. However, since the size of the outside entity can vary from a single party to a larger firm, this arrangement may scale effectively as a group grows and may be used for larger groups.[87] Of course, the role and duties of the central body are critical.

First, the central body's role is the relatively straightforward collection of negative knowledge. At an agreed upon interval (discussed below), members will submit to the central body negative knowledge gained during the previous interval.

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[86] *See* John Orcutt & William Murphy, *Open Innovation and Collaborative Platforms: Legal Issues*, *in* PLATAFORMAS ABIERTAS PARA TECNOLOGÍAS ESTRATÉGICAS: RELEVAMIENTO, ANÁLISIS DE PRE-FACTIBILIDAD Y PROPUESTA DE DISEÑO DE MODELO CONCEPTUAL 1, 18 (2015).

[87] Another potential arrangement involves the members creating a separate entity that is jointly owned. In this arrangement, the members are each shareholders of a legal entity that carries out the central body's roles. This would allow for more complexity and control in creating the group and may be better suited to larger groups. However, this type of arrangement introduces further issues of securities law, antitrust law, and independence, and is therefore out of the scope of this Article.

Next, the central body must analyze the submitted information. This role necessitates access to experts in the field to properly assess the value of any given piece of submitted negative knowledge. Any collective venture faces the possibility of free-riders. Since free-riders are anticompetitive by nature, this threat is significant.[88] Although some argue that some level of free-riding is acceptable and will not stifle innovation, an ideal implementation of the model will have no free-riding.[89] Members free-riding by not submitting but still receiving the report is simple to detect and mitigate. A much more concerning problem is that of members submitting low quality, low value negative knowledge. To detect this issue, experts in the field will need to analyze the submitted information to ensure it meets certain standards set by the contractual arrangement. This function of the central body closely mimics that of "patent assessors" found in some patent pool arrangements.[90] In these patent pool arrangements, every submitted patent undergoes a valuation process by a board of experts, and the royalties from the pool are distributed based on that valuation.[91] Unlike patent pools, this model has no royalty distribution, but a valuation of the submitted piece of negative knowledge may be similarly generated to ensure that the submitted information meets a prescribed threshold.

Finally, the central body must standardize and anonymize the negative knowledge. This function of the central body is critical to limiting misuse of the generated reports. Standardizing and anonymizing can also serve an important role in limiting the members' ability to engage in

[88] Orcutt & Murphy, *supra* note 88, at 3.
[89] Levine & Prietula, *supra* note 73, at 1419.
[90] Orcutt & Murphy, *supra* note 86, at 21.
[91] Orcutt & Murphy, *supra* note 86, at 21; Michael Mattioli, *Power and Governance in Patent Pools*, 27 HARV. J. L. & TECH. 421, 449 (2014).

unfairly competitive uses of the report. For example, such illicit uses could include using the report to identify which member submitted which information. That identity could be used to gain a competitive advantage. For example, knowing that a competitor uses a certain research technique could be helpful in reverse engineering—and therefore destroying—another one of the competitor's trade secrets. Since misuse of the report poses a significant threat to the viability of the model, the standardization and anonymization of the report functions as a safety system to ensure no such misuse occurs. Anonymization serves this goal by removing any characteristics of the information that may help identify its source. Standardization serves this goal by ensuring that all of the negative knowledge is presented in a standard form, eliminating or limiting the members' ability to deduce the source of any given piece of negative knowledge. After the submitted negative knowledge is analyzed, anonymized, and standardized, it is compiled into a report and published to the member entities.

B. Frequency and Conditions Precedent

Two important determinations members need to make when forming a contractual arrangement to implement this model are the frequency of submissions and the conditions precedent for submissions. The two are closely related and together define an important operating characteristic of a group.

Frequency of submission is simply the standard interval for submission and the publication cycle of the report. The frequency is highly industry dependent. Fast-paced industries that engage in extensive research may want a higher frequency of published reports to match the pace of the industry. Alternatively, groups may want to

allow enough time between submissions for research to more fully mature, to provide more salient and high-quality negative knowledge insights. Thus, frequency is an industry-specific determination that balances quality of output with pace of research.

A condition precedent divides groups into two different types: breakthrough dependent groups and "submit what you have" groups. Breakthrough dependent groups are those where submission is conditioned on achieving some breakthrough or reaching some goal in the previous interval. In these groups, members only submit *negative* knowledge if they have generated some meaningful *positive* knowledge first. The rationale for this condition precedent is to ensure that submitting members have a head start on research before they are required to divulge information. Essentially, members must divulge information that will bring their competition up to speed, but not at such a time that it will allow the competition to jump ahead. This condition is therefore tailored to groups where the technology is directly competitive, rather than complementary.

In "submit what you have" groups, no such condition is present. Because these groups are likely to focus on complementary, rather than competitive technology, there is no need to ensure that members have reached a breakthrough before submitting. Since the technology is complementary, submitting information without reaching a breakthrough does not give other members a competitive advantage. In groups where both complementary and competitive technology is present, it is preferable to have a breakthrough condition, or to assign conditions on a member-by-member basis to maintain a fair competitive landscape.

Another likely contract term is conditioning receipt of the compiled report on the submission of information. This reduces the threat of free-riding. Members who did not submit information for that interval, as well as members whose submissions did not reach the quality threshold, cannot receive the benefits of that report. Alternatively, non-submitting members' receipt of the report could be conditioned on the payment of a fee. In this scenario, members would either obtain the report in exchange for their own submission, or in exchange for an agreed upon price.

C. Limits and Enforcement

The conditions precedent, analysis, and anonymization/standardization of the report are all designed to reduce the possibility of free-riders. However, free-riders do not pose the only threat to the viability of the model. One potentially potent issue is the misuse of the published information. The solution to this issue is limiting use of the report to research and development to prevent members from using the report as a means of unfair competition.

By nature, the published report contains trade secrets and details about each member that members do not want to divulge. While the negative knowledge itself is useful to avoid repeating fruitless research paths, tangential information, including research methods, equipment and capacity, advanced capabilities, and budgetary information may be invaluable to competitors, and impossible to fully scrub from the report. Like metadata attached to documents distributed to opposing counsel, this information can be more valuable than the document (or negative knowledge) itself, and must be protected

accordingly.[92] Ideally, this information would be unknowable from the report, however, this ideal is likely impossible.

Strict limits should therefore be placed on the uses of the report. While member entities are encouraged to use the report to streamline their own research, using the report to gain competitive advantages not stemming from increased research and development efficiency must be expressly forbidden. By doing so, a breach of contract cause of action is created for affected members, allowing for these information misuses to be addressed in court.

Misuse of information, as well as other enforcement issues such as failure to submit research, free-riding, consistent low-quality submissions, and others, may be enforced through the central body. Groups may choose to implement a mandatory arbitration agreement between members to further lower transaction costs and keep disputes off of the public record.

D. Qualifying Characteristics

Certain characteristics may predispose some industries to benefit more from adopting the proposed model than others. These characteristics are explained below. However, the proposed model may work well in a large number of industries in which I am not an expert. For this reason, the suggested characteristics should not be read as limiting.

Industries in conventionally "high tech" sectors are the primary beneficiaries of this model. While other industries may also benefit from the model, high tech

[92] *See* MODEL RULES OF PROF'L CONDUCT 4.4 cmt. 2 (AM. BAR ASS'N 2018) (discussing proper handling of document metadata).

industries are those with the highest research and development output. With high levels of R&D comes high levels of generated negative knowledge, the intelligent use of which is the focus of this model.

As well as being high tech, industries with highly complex technologies may enjoy more benefits from the model more than industries with relatively simpler or better understood technologies. In highly complex systems, understanding the relationship between changed variables and changed outputs can be more difficult than in systems of less complexity. For example, putting thinner tires on a bicycle will probably increase its maximum speed, and that result is expected because, for the relatively simple bicycle system, the relationship between aerodynamic tires and maximum speed is well understood. On the other hand, making a minor change to the chemical formula of a drug may have unforeseen effects on the human body, an incredibly complex system. It stands to reason that highly complex systems will benefit more from a negative knowledge sharing industry group, since understanding the negative knowledge can help define the system. In more well understood and less complex systems however, negative knowledge may carry relatively lower value.

Another characteristic that may predispose an industry to the benefits gained through the adoption of the proposed model is a tendency for incremental innovation. Consider the blast furnace example from earlier. There, all of the improvements were incremental, meaning that companies were more likely to share.[93] If any one of the companies had made a major breakthrough, it would have been more beneficial to keep the breakthrough secret, since

[93] Pedraza-Farina, *supra* note 55, at 10.

the competitive advantage is more clearly cognizable. Where innovation is incremental in nature, the benefit of sharing may more easily outweigh the cost, making the proposed model more appealing. Furthermore, incremental innovations are less likely to be patentable—since they are more likely to be considered legally obvious—and therefore more likely to be kept as trade secrets.[94]

The final two characteristics go hand-in-hand and are thus presented together: clearly definable industry goals and clearly definable potential solutions. Here, the focus is on well-known research paths. Industries where the potential research paths are well-known may have parties more willing to share the negative knowledge generated from those paths. The reason here is based in the earlier discussed issue of misuse of the generated report, discussed in Section IV.C., *supra*. In an industry where it is unclear how to approach researching a solution for a known problem, any information about how a competitor is approaching that research is incredibly valuable. Therefore, in those industries, the incentives to misuse the shared data are significantly higher. Alternatively, consider an industry developing a chemical solution with fifteen well-known lead compounds. In that industry, knowing what competitors are researching is far less valuable, since it is one of those fifteen lead compounds. In a race, simply knowing that a competitor's strategy is "go faster" doesn't provide a lot of competitive advantage. Because of the lower incentives to misuse a generated report, industries with more clearly definable goals and clearly definable or known solutions will probably see more of a benefit from the proposed model than ones without.

[94] 35 U.S.C. § 103 (2012).

E. Exemplary Industry

To better understand how the aforementioned characteristics come together in a cohesive model, an exemplary industry is discussed below. The exemplary industry here is a chemical development and manufacturing industry. In this industry, there is a well-known need for a stronger adhesive for certain commercial applications. Aside from having a well-known problem, the potential solutions to the problem are also well-known. Ten promising lead compounds are known within the industry; one or more of the compounds will probably yield an effective adhesive.

The practical problem faced by the industry is that the costs associated with researching all ten lead compounds to find the one that works is prohibitively expensive. Moreover, because finding the solution may require researching all ten lead compounds, and because a competitor may happen to research the better solution first, the industry is experiencing a collective inaction problem.

This industry is the perfect setting to implement the proposed model. In this example, eight competitors agree to form an industry group under the proposed model. The contractual arrangement is created and signed, and a consulting company is hired to fulfill the central body role. Because the group has agreed to share negative knowledge, the cost of research for any given member is reduced, and all members begin researching the various lead compounds.

A year into the research cycle, five of the eight competitors have made significant steps towards identifying a promising adhesive and process for manufacturing the same, two of the competitors successfully eliminated potential lead compounds, and one

of the competitors failed to make any significant breakthrough. Since the technology is directly competitive, the group is a breakthrough-dependent group, meaning that competitors only need to share negative knowledge if they have reached a significant milestone. Therefore, the five members who made significant steps submit negative knowledge to the central body. The two members who have not made significant positive steps, but who have eliminated non-working compounds may choose to submit but are not required to. The eighth member has nothing to submit.

Once the central body receives the negative knowledge, each piece of negative knowledge is analyzed to ensure that it meets certain minimum standards set by the contract. For example, the group may require that each piece of negative knowledge clearly demonstrates a minimum number of man hours of work saved through its implementation. If, by not pursuing work on one of the eliminated lead compounds, the group members can save a certain amount of R&D budget or a certain amount of man hours of research time, the negative knowledge has met the quality standards. The negative knowledge is then anonymized and put into a standard format to ensure that it cannot be easily traced back to the group member that generated it. A report of the negative knowledge gained is compiled and distributed to the contributing members. Since the eighth member did not submit any negative knowledge, the eighth member does not receive a copy of the report. Members whose contributions did not meet the minimum quality also do not receive the report, unless they have mitigated the original quality issues.

In this exemplary industry, the benefits of the model are clear. Each of the contributing members divulged a single negative knowledge trade secret, and in return

gained six relevant, high-quality negative knowledge trade secrets. Rather than pursue research already done (and proven fruitless) by their competitors, each member can streamline its research pathway and avoid pitfalls. As an industry, less resources are wasted on non-working research, and the eventual solution will probably be found more quickly than it otherwise would have. Furthermore, employees may be more mobile between the members, further increasing the innovative pace of the group.

F. Benefits

The three main criticisms of negative knowledge trade secret protection are that it severely limits employee mobility, undercuts the general skills and knowledge rule, and does not fit within traditional justifications of trade secret law. The proposed model helps mitigate these issues by allowing for increased employee mobility between member entities, by restoring the general skills and knowledge status of negative knowledge within groups, and by increasing industry efficiency and innovative output.

The first two issues go hand-in-hand, and the proposed model's mitigating effect will therefore be discussed jointly. Negative knowledge trade secret protection limits employee mobility by forcing employees at new firms into unworkable situations when faced with research challenges that involve their prior employer's negative knowledge.[95] Avoiding use and disclosure of a former employee's negative knowledge trade secret may involve repeating past mistakes to a degree that avoids any potential accusations that the employee is granting the new employer a head start; in doing so, the new employee becomes more of a liability than an asset.[96] The proposed

[95] *See* Graves, *supra* note 5, at 410.
[96] Graves, *supra* note 5, at 411.

model mitigates the dangers associated with negative knowledge use and disclosure by allowing employees to freely disclose and use negative knowledge that has been shared with the group. Essentially, the proposed model takes negative knowledge and places it back under the umbrella of an employee's general skills and knowledge. If an employee gets hired by another group member, the limits on the employee's ability to use negative knowledge are greatly reduced. Since the proposed model is essentially a cross-licensing contractual arrangement, any information that has been shared is already useable by the new employer. Furthermore, since the arrangement is ongoing, it is unlikely that employees would face punishment for using negative knowledge not yet shared by the former employee, since it will likely be shared in the near future. By restoring the previously protected negative knowledge to general skills and knowledge status within the group, employees have significantly more freedom to move between group members.

While this loosening of the restraints on employee mobility may only exist between member entities, this does not pose a significant problem. Mobile employees are likely to move between entities within the industry. Furthermore, where employees move outside of the industry, the risk of former employers enforcing their rights by bringing negative knowledge trade secret claims is low. Moving outside the industry will not grant a competitive advantage, since the employee has left the industry. Furthermore, moving outside of the industry probably entails leaving the specific technology or research area, so employees are unlikely to have a use for their negative knowledge at the new firm, even if it could grant a competitive advantage.

The only issue, therefore, is that employee mobility is still limited for employees looking to move from a company in the group to a company outside the group. However, this effectively creates further incentives to join the group, which is a net positive for the industry. Access to a more mobile talent pool may be a strong incentive for creating and joining groups formed under the proposed model.

The proposed model also solves the issue of negative knowledge not comporting with traditional rationales of trade secret protection. By more freely sharing negative knowledge between member entities, the pace of industry-wide innovation is increased,[97] transaction costs between member entities are reduced, and follow-on innovation is expanded. Overall, the proposed model works to encourage increased dissemination of information, bringing it directly in line with traditional intellectual property rationales.[98]

The model increases the pace of industry-wide innovation because increased employee mobility leads to increased output, and increases efficiency by limiting the wheelspin of repeating competitor mistakes.[99] High levels of employee mobility are seen by some as the driving force behind the success of Silicon Valley.[100] By fostering a legal and social environment where employees are able to freely move between competitors or leave to start their own companies, the Valley has become the epicenter of the American high tech sector.[101] The proposed model brings

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[97] *See generally* Pedraza-Farina, *supra* note 55.
[98] Lemley, *supra* note 36, at 333.
[99] LOBEL, *supra* note 13, at 12.
[100] LOBEL, *supra* note 13, at 65.
[101] LOBEL, *supra* note 13, at 64–65; Pedraza-Farina, *supra* note 55, at 33.

the innovation-increasing benefits of high employee mobility to industries in areas without the Valley's employee-friendly legal framework. By removing one of the barriers to mobility between member entities, groups can enjoy the increased innovative output of high employee mobility without having to change the laws in their locale.

Furthermore, the proposed model increases the innovative output of an industry simply because the distribution of relevant information increases innovative pace.[102] Looking again at the blast furnace and open-source software examples, it is clear that industries with high levels of collaboration have enjoyed increased innovative output.[103]

Moreover, under the proposed model, players in an industry are less likely to repeat the research mistakes of their peers. By limiting the repetition of mistakes and the overlapping of research, the proposed model increases the efficiency of an industry group. While there is some benefit to redundancy and repetition, the complete replication of research that a competitor knows is a waste of effort and resources. Industries enjoying lower levels of such wheelspin—those that adopt the proposed model—are likely to see an increase in research efficiency and a corresponding increase in innovative output.

The model also benefits members and comports with traditional IP rationales by limiting transaction costs between group members. Trade secret litigation can be extremely expensive and removing one cause of action (misappropriation of negative knowledge) may lower the amount of litigation within an industry. In a recent case,

[102] Pedraza-Farina, *supra* note 55, at 33.
[103] Pedraza-Farina, *supra* note 55, at 33.

self-driving car company Uber settled a trade secret claim with rival Waymo to the tune of $245 million.[104] While the case involved a variety of trade secret claims, at least one of the eight alleged injuries was a negative knowledge trade secret claim against a former employee.[105] Although this is a single example, it highlights the sky-high potential cost of negative knowledge trade secret litigation. By cross-licensing negative knowledge between member entities, the proposed model eliminates the source of many possible negative knowledge-based trade secret disputes. Not only does it lower possible litigation costs by removing a major source of disputes, it removes that source of disputes between the players in an industry most likely to sue one another.

The third major benefit of the proposed model is the corresponding increase in follow-on innovation. In patent law, disclosure helps to encourage follow-on innovation by building a roadmap of what has been successful. By creating a map of the already traveled areas, patent disclosures can be used to find unexplored white space. Furthermore, patent disclosures fully define an enabled invention, allowing players in the industry to build follow-on inventions on the back of existing disclosure. The disclosure of the proposed model encourages follow-on innovation in a slightly different way. First, by defining failed research paths, the proposed model defines which paths have been tried, and suggests which paths may be

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[104] Alexandria Sage et al., *Waymo Accepts $245 Million and Uber's 'Regret' to Settle Self-Driving Car Dispute*, REUTERS (Feb. 9, 2018), https://www.reuters.com/article/us-alphabet-uber-trial/waymo-accepts-245-million-and-ubers-regret-to-settle-self-driving-car-dispute-idUSKBN1FT2BA [https://perma.cc/S472-ZLXC].

[105] Daisuke Wakabayashi, *Secrets or Knowledge? Uber-Waymo Trial Tests Silicon Valley Culture*, THE NEW YORK TIMES (Jan. 30, 2018), https://www.nytimes.com/2018/01/30/technology/waymo-uber-lawsuit.html [https://perma.cc/QF96-66S5].

successful. This essentially provides member entities a roadmap for how to conduct follow-on innovation and avoid repeated mistakes. Second, by clearly defining the failed research paths, the model allows for members to go back over failed research in an effort to determine what went wrong, why, and how the path could be corrected. Currently, if a company tries an experiment and it fails, the rest of the industry will never know. Besides creating inefficiencies by allowing competitors to repeat the mistake, this also creates inefficiencies in that competitors wishing to try the same experiment have no precedent with which to base their experimental design. Under the proposed model, both inefficiencies are eliminated. Not only can member entities avoid other parties' mistakes, but they can also redo competitor experiments using the published negative knowledge as a basis for a second attempt. The proposed model's disclosure increases the pace of follow-on innovation by providing a roadmap for research to avoid, as well as by creating a basis for repeating and fixing failed research paths.

G. Issues—Antitrust Law

While the proposed model may introduce numerous benefits, there are also issues that must be overcome to successfully implement a model compliant cooperative arrangement. The three main issues are free-riding,[106] misuse of information, and antitrust law.[107] Free-riding and misuse of information have been addressed in Part IV, *infra*. None of these issues are prohibitively difficult to overcome, and in most cases the solution is forming the contractual foundation of the arrangement to avoid these issues.

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[106] Orcutt & Murphy, *supra* note 86, at 3.

[107] WILLIAM MURPHY, R&D COOPERATION AMONG MARKETPLACE COMPETITORS 9 (1991).

The third major potential issue with implementation of the proposed model is the effect of antitrust law.[108] The proposed model may sound like a clear implementation of anticompetitive strategies, since any model involving collaboration among competitors is liable to be scrutinized through the lens of antitrust law. However, this first impression is not necessarily correct, and the proposed model does not fall within the *per se* illegal categories restricted by antitrust law.[109] These categories include "price fixing, collective boycotts, [and] market sharing."[110] As the proposed model does not constitute any of those actions, it is not prohibited by default. However, the concern of cooperation amongst competitors giving the impression of potential antitrust violations still lingers. Since a direct discussion of the proposed model's potential compliance/liability issue with antitrust law is not available, an analogy will be drawn to a similar concept: the patent pool.

Patent pools are cross-licensing agreements between competitors who own blocking patents over each other's technology, created so that the pool can license the technology to third parties without the third parties having to obtain separate licenses from each involved entity.[111] The proposed model may be seen essentially as a negative trade secret analog of patent pools. Competitive entities essentially cross-license their negative trade secrets to minimize transaction costs and maximize R&D potential.

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[108] Orcutt & Murphy, *supra* note 86, at 9.

[109] *See* MURPHY, *supra* note 107, at 37 (discussing *per se* illegal activities).

[110] MURPHY, *supra* note 107, at 37.

[111] World Intellectual Property Organization [WIPO], *Patent Pools and Antitrust – A Comparative Analysis*, (MAR. 2014), https://www.wipo.int/export/sites/www/ip-competition/en/studies/patent_pools_report.pdf [https://perma.cc/CMK2-7F69].

Unlike patent pools, however, there are no division of royalty issues, since there is probably no significant income stream into the central body. Accordingly, the division of royalty issues faced by patent pools will not be discussed here.[112]

Patent pools, and, by extension, arrangements formed under the proposed model, face two main antitrust issues.[113] First, the potential for enforcement actions imposes steep liabilities and increases operating restrictions.[114] Second, the ability of group members or pool participants to bring an antitrust suit may give participants undue influence over the formation and power distribution of the group or pool.[115] Patent pools face the third issue that the external threat of antitrust suits may put downward pressure on royalty prospects; this issue is not shared with the proposed model because of the aforementioned lack of significant royalty potential.[116]

The general thrust of antitrust law's relationship with patent pools is that certain licensing arrangements are pro-competitive while others are anticompetitive; so long as an arrangement appears more in line with pro-competitive tenets, it will probably avoid antitrust concerns.[117] To this end, the Department of Justice (DOJ) has released guidelines specific to patent pools that outline the procompetitive benefits of potential pooling relationships.[118] In its guidelines, the DOJ summarized that

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[112] *See* MERGES, *supra* note 83, at 12–13 (discussing patent pool royalty issues).
[113] MERGES, *supra* note 83, at 40–41.
[114] MERGES, *supra* note 83, at 40.
[115] MERGES, *supra* note 83, at 41.
[116] MERGES, *supra* note 83, at 40–41.
[117] *See generally* MERGES, *supra* note 83, at 40–41; Orcutt & Murphy, *supra* note 86, at 10.
[118] MERGES, *supra* note 83, at 43–44.

cross-licensing arrangements "may provide procompetitive benefits by integrating complementary technologies, reducing transaction costs . . . [and] avoiding costly . . . litigation. By promoting the dissemination of technology, cross-licensing . . . arrangements are often procompetitive."[119] The guidelines go on to provide examples of potentially anticompetitive cross-licensing arrangements such as "collective price or output restraints . . . or coordinated output restrictions," which may be illegal if "they do not contribute to an efficiency-enhancing integration of economic activity among the participants."[120] In patent pooling arrangements, antitrust concerns are alleviated where steps are taken to reduce the risk of competition-eliminating effects.[121]

Essentially then, arrangements formed under the proposed model should endeavor to avoid antitrust issues, or the appearance of antitrust issues, by creating groups where the procompetitive benefits outweigh any anticompetitive aspects of the arrangement. Research and development and competition are circularly related; since "investment that leads to innovation can be seen as both the cause and the result of competition," antitrust policy must strive to regulate activity with the goal of encouraging investment in innovation.[122]

As discussed above, potential benefits from groups formed based on the proposed model include reduced transaction costs, increased efficiency, and the promotion of follow-on invention. All of these benefits work to both

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[119] U.S. DEPARTMENT OF JUSTICE, 1995 ANTITRUST GUIDELINES FOR THE LICENSING OF INTELLECTUAL PROPERTY § 5.5 [*hereinafter* ANTITRUST GUIDELINES].

[120] *Id.*

[121] MERGES, *supra* note 83, at 45.

[122] MURPHY, *supra* note 107, at 42.

promote innovation and competition, since none of these benefits suppress research and development by member entities. However, one issue faced by such groups is the raising of the barrier to entry for newcomers to a field. Since existing groups create a new cost for newcomers to a particular industry, the barrier for entry to industries with such groups may appear to be an anticompetitive threat. However, as seen from patent pooling arrangements, simply having anticompetitive aspects in an arrangement does not doom that arrangement to fail due to antitrust enforcement. Patent pools also raise the barrier for entry by requiring industry newcomers to contribute blocking patents to enjoy the benefits of the patent pool.[123] However, patent pools may still exist so long as they provide a pro-competitive benefit to the industry.[124] These pools fall within the "types of cooperative activities" that "promote 'fair competitive opportunities'" and thus comport with the notions of "workable competition."[125] By following guidelines provided by analogous patent pooling arrangements, entities may avoid any potential antitrust issues.

V. CONCLUSION

Negative knowledge trade secret protection suppresses innovative output. By chilling employee mobility, undercutting the general skills and knowledge rule, and failing to comport with traditional trade secret rationales, trade secret protection for negative knowledge does more to harm innovation than it does to help. However, some of these negative effects may be mitigated or eliminated by adopting a model based on information

[123] MERGES, *supra* note 83, at 44; ANTITRUST GUIDELINES, *supra* note 119.
[124] Orcutt & Murphy, *supra* note 86, at 22.
[125] MURPHY, *supra* note 107, at 35.

sharing. In certain scenarios, industry-wide innovation can benefit from looser information restrictions and more information sharing—even amongst competitors.

By using the suggested model for cross-competitive negative knowledge information sharing, innovative output of certain qualifying industries will increase. Importantly, this model aims to implement a contract-based, private market alternative to negative knowledge trade secret disputes, and does so without any change to existing trade secret law.

Groups formed under the proposed model will share negative knowledge with all group members at set intervals. A central body collects and distributes the information and serves certain membership duty enforcement roles. By sharing negative knowledge amongst competitors working on like projects, group members avoid redundant mistakes, increase research and development efficiency, and increase the overall innovative output of the group. Furthermore, the negative effects of negative knowledge protection are mitigated by removing the source of negative knowledge trade secret disputes and by allowing for increased employee mobility. Overall, in certain industries, implementation of this model may help eliminate negative knowledge trade secret concerns while simultaneously benefiting the industry and society.