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Introduction

Since the conception of the United States as a country, an unceasing goal to be the best has been present, the pinnacle of what a country should be or should want to be. Throughout American history, this has most clearly been exemplified through an unceasing desire to be “first.” That is, the very American goal is to be pioneers or trailblazers in some strange new idea or concept, and then to become the very best within that idea or concept’s parameters, essentially to engage and succeed in competition. Some examples include American Industrialization, the creation of penicillin, the first atomic bomb, the Space Race, and even the creation of the fast-food industry.

Fast forward to today, this American ideal still exists, perhaps with even more strength and fervor, due to the amount of information available to the public through the internet. Perhaps the most important and potentially world-changing work involves various new and evolving technologies like artificial intelligence (“AI”), 5G, and many more. The United States has a significant interest in these evolving concepts, due to the “towering national security advantages” that will come to the country who gains the lead in such critical research.¹ While the pursuit of these technologies is sure to make life easier and pave the way for new inventions, there are significant worries regarding *who* gains the lead on research and advancement in these technologies. Perhaps the most significant threat to the U.S. in this field stems from a lack of “comprehensive intellectual property policies to incentivize investments” and a strong push from China through domestic and geopolitical strategies to fill the void of U.S. intellectual property global leadership.² Additionally, a large portion of theft of U.S. intellectual property has been

¹ Andrei Iancu & David J. Kappos, *U.S. Intellectual Property is Critical to National Security* (July 12, 2021), <https://perma.cc/DG4H-S48L>.

² NAT’L SEC. COMM’N ON A.I., FINAL REPORT [1] (2021).

attributed to China, which in turn creates an issue where not only is U.S. national security being threatened on what appears to be a policy axis, but dually so from the theft of actual intellectual property.³ The acknowledgment that intellectual property is integral to U.S. national security is necessary for the U.S. to continue to thrive. In order to acknowledge the field and to protect the innovations and inventions within that field, the U.S. needs significant policy changes. In order to continue to grow and embrace the American ideal of competition, the U.S. needs to fully embrace and engage the intellectual property field.

What is Intellectual Property?

Before delving too deep into the various threats, answers, and policy questions regarding intellectual property, it is important to have a strong understanding of what intellectual property is, what the components of intellectual property are, and what intellectual property law really *does*. Additionally, in order to understand the relationship between intellectual property and national security, a firm definition and understanding of trade secrets and patents is necessary.

Intellectual Property Law Components

Intellectual property is a unique field of law into itself, as the core of intellectual property deals with intangible property; the most common example of intangible property would be a unique idea or concept. Intellectual property laws grant owners of ideas or creators limited property rights for their unique ideas. In short, intellectual property law regulates “control over the products of intellectual effort.”⁴ Intellectual property is comprised of three major subjects: copyrights, patents, and trademarks.⁵ Copyright law grants authors exclusive rights in their

³ Iancu & Kappos, *supra* note 1.

⁴ Joseph W. Singer et al., *Property Law: Rules, Policies, and Practices* 175 (Rachel E. Barkow et. al. eds., 7th ed. 2017).

⁵ *Id.*

original works of authorship, such as fiction novels, movies, etc., while patent law grants exclusive rights in inventions, such as machines or processes.⁶ Trademark law grants exclusive rights in symbols that indicate the source of goods or services and unlike patent and copyright law, trademark law originated in the state common law.⁷ “Trade secrets” are a smaller section of intellectual property, but an incredibly important one in the realm of national security. Trade secrets, like trademarks, originated in state common law, and they are universally defined as, “any formula, pattern, device or compilation of information which is used in one’s business, and which gives him an opportunity to obtain an advantage over competitors who do not know or use it.”⁸ Of the components of intellectual property discussed above, the two that are distinctly related to national security are trade secrets and patent law.

Patent Law

As stated above, patent law deals primarily in the exclusive rights of inventions, more specifically things such as processes, machines, and compositions of matter. The U.S. Patent Act was enacted by Congress under its constitutional grant of authority to “secure for limited times to investors the exclusive right to their discoveries.”⁹ In dealing with these exclusive rights, inventors are essentially granted “a monopoly over their inventions for up to 20 years” in accordance with 35 U.S.C. § 101.¹⁰ Patents are granted by the U.S. Patent and Trademark Office (USPTO).¹¹ The inventor submits an application and so long as the patent meets the five

⁶ *Id.*

⁷ *Id.*

⁸ *Brown v. Rollet Bros. Trucking Co.*, 291 S.W.3d 766, 776 (Mo. App. E.D. 2009).

⁹ U.S. Const. art. I, § 8, cl. 8.

¹⁰ Joseph W. Singer, *supra* note 4.

¹¹ *Id.* § 2(a)(1).

requirements within 35 U.S.C. §§ 101-103, and 35 U.S.C. § 112, the USPTO grants the inventor a patent. The five requirements are:

(1) the subject matter of the invention must be patentable, i.e., a “machine,” method of “manufacture,” or “composition of matter,” 35 U.S.C. §101; and the invention must be (2) novel, 35 U.S.C. § 102; (3) nonobvious, 35 U.S.C. §103; (4) useful, 35 U.S.C. §101; and (5) fully and particularly described, 35 U.S.C. §112.

Once a patent has been issued, the owner of the patent may bring a lawsuit against anyone accused of infringing the patent.¹²

The theory, at least in the eyes of a centralized government awarding patents, is that patents are “intended to reward inventors and encourage innovation...”¹³ This encouragement of innovation is in line with the American ideal of competition and looks to increase the amount of technological innovation that would benefit the U.S. Potential patents that are seen to be particularly important, such as AI or 5G, are paid special attention and care.¹⁴

Trade Secrets

Trade secrets allow entities to protect important pieces of information or technologies that may be outside of the usual patent protection range, such as customer lists or business strategies. Trade Secrets are not governed by federal statute, but instead are decided state-by-state. The Uniform Law Commission created the Uniform Trade Secrets Act (UTSA) which has been adopted by 47 states and the District of Columbia to date. The UTSA defines a “trade secret” as:

information including a formula, pattern, compilation, program, device, method, technique, or process that: derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by,

¹² Uniform Trade Secrets Act (UTSA), Practical Law Glossary Item 8-503-0516.

¹³ Charles Duan, *Do Patents Protect National Security?* (July 12, 2019, 8:20 AM), <https://perma.cc/7FKR-3WSK>.

¹⁴ *Id.*

other persons who can obtain economic value from its disclosure or use; and is the subject of efforts that are reasonable under the circumstances to maintain its secrecy.¹⁵

Most states follow the definition provided above, and if there are any changes entirety of the definition is still typically close to the definition provided by the USTA, as shown above in *Brown v. Rollet Bros.*

There are essentially three elements to a trade secret claim: “(1) The subject matter involved must qualify for trade secret protection; (2) the holder of the subject matter must establish that reasonable precautions were taken to prevent disclosure of the subject matter; and (3) the trade secret holder must prove that the information was misappropriated or wrongfully taken.”¹⁶ Trade secrets are typically only deemed “misappropriated” when the secret is obtained through improper means or involves a breach of confidence; though, they may be obtained through lawful means such as “independent discovery, reverse engineering, and inadvertent disclosure resulting from the trade secret holder’s failure to take reasonable protective measures.”¹⁷

While similar to patents, trade secrets have notable advantages. According to Drew Emmert, a transactional attorney of Dressman Benzinger Lavelle PSC, so long as trade secrets are kept secret, there will be no expiration date for the protections, as compared to the 20-year patent limit.¹⁸ Additionally, trade secrets are intended by design to be kept secret so there are no potential issues of individuals taking designs as put out by patents, and sensitive information is able to be protected without exposing the technicalities or specifics. From a nationalistic perspective, introducing patentable ideas as trade secrets creates conflict with the idea that

¹⁵ Uniform Trade Secrets Act (UTSA), Practical Law Glossary Item 8-503-0516

¹⁶ Legal Information Institute, <https://perma.cc/33YA-W7UK>

¹⁷ *Id.*

¹⁸ Drew Emmert, *Intellectual Property and the Importance of Trade Secrets*, (May 26, 2020), <https://perma.cc/3H7L-CBKV>.

countries wish to inspire innovation within the country, which may be harder to do if every invention or innovation was kept as a trade secret.

Intersection of National Security, Patent Law, & Trade Secrets

The U.S., like any major country, values national security as one of its top priorities. Traditionally, the term “national security” evokes images of military operations, law enforcement, and NSA agents huddled over computer terminals listening in on phone calls. However, the regulation and promotion of a strong economy is another, albeit less flamboyant, aspect of national security. Without a secured and functioning economy, there is undoubtedly no State, or at least not a strong one. In order to compete globally and produce a strong economy, the management and regulation of intellectual property rights are essential. Specifically, the creation of strong policies and regulations in the realm of patent law and trade secrets are integral to the growth of a country’s economy and thereby the promotion of national security. Without a focus on these areas of intellectual property, the U.S. is in danger of falling behind other countries in the race for new and evolving areas of technology and science.

Overview of Patents, Trade Secrets, & National Security Relationship

According to Rob Farley, senior lecturer at Patterson School at the University of Kentucky and visiting professor at the U.S. Army War College, the two main areas of intellectual property that deal with national security are patent law and trade secrets. On the U.S. Army War College’s podcast, “War Room,” Farley noted that patent law, “is important to figuring out how a state can drive innovation in its defense industrial base.”¹⁹ Farley also notes how changes in government oversight and regulation of patents are catalysts to what types of inventions are

¹⁹ War Room, *Intellectual Property Rights & National Security*, U.S. Army War College (Feb. 5th, 2019), <https://perma.cc/KMH2-K94R>.

invented and how firms or inventors interact in the field of intellectual property.²⁰ As evidence to this point, he points to the origins of patent law, specifically how the government specially chose to grant monopolizing patents to those inventors who were performing research in fields that would be most beneficial to national security.²¹ Farley also points out the strategic use of patents by the U.S. and British governments in the early 20th century to control the manufacture and production of inventions such as the torpedo, certain firearms, and aviation technologies; and also to prevent global dissemination of information.²² Farley's examples and historical overview serve to demonstrate the basic uses that patent law has in the simplest example of national security. By simply granting patents to chosen inventors, the U.S. (and the British government to an extent) was able to not only gain a significant lead in the scientific and technological race of the 20th century but was also able to prevent its competition, other countries, from gaining access to that same information quite so easily.

On trade secrets, Farley notes that the importance lies in the ability of both privately owned and government-owned firms with trade secrets to prevent other companies or other countries from learning their trade secrets.²³ In the realm of national security, this applies to the ability to prevent other companies, foreign and domestic, from learning their trade secrets.²⁴ Of course, this is immensely important for traditional national security purposes regarding protecting military technologies, or just not allowing others to become aware of your country's capabilities.

²⁰ *Id.*

²¹ *Id.*

²² *Id.*

²³ War Room, *Intellectual Property Rights & National Security*, U.S. Army War College (Feb. 5th, 2019), <https://perma.cc/KMH2-K94R>.

²⁴ *Id.*

Importantly, Farley notes on the international intellectual property protection history, how the “main strategy” in the fledgling era of intellectual property law, the 19th century, was to “steal as much as we can, develop these technologies, and *then* push for international intellectual property protection.”²⁵ Notably, the beginning of this cooperative push, mostly led by the U.S. following its technological advancement, was not until the late 20th century.²⁶ This interest in protecting intellectual property arises out of two main components, within the military domain and the economy. According to Farley, the military drive is obviously to prevent hostile or competing countries from gaining access to the type of military technology that your country is working on or has ownership of.²⁷ The economic drive is in line with the thinking that keeping access of certain intellectual property is important in keeping poorer or less technologically advanced countries contained within that economic sphere, in order to prevent them from becoming economic competitors, thereby also a promotion of protecting national security.²⁸

Farley’s analysis and description of patent law and trade secrets demonstrates two specific applications of intellectual property law within national security. The first, and the more obvious, application is the basic use of patent law and trade secrets to develop or encourage the development of inventions, techniques, or other applicable material that correlates with military or surface-level national security use. The second application deals with the use of patents or trade secrets to either advance one’s own country’s economy or to inhibit another country’s economy or economic development. This second application is one that has come into fruition in the 21st century, where large scale war efforts or direct military conflicts are no longer as viable due to the threat of nuclear escalation; more and more countries are more willing to fight on the

²⁵ *Id.* at 6:12.

²⁶ *Id.*

²⁷ *Id.*

²⁸ *Id.*

economic front rather than risk igniting a nuclear war. Both applications of intellectual property are integral to the success and continued promotion of national security in the U.S.

Lack of American Progression in Intellectual Property Policy

Similar to Farley, both Andrei Iancu and David J. Kappos, former directors of the USPTO, argue that not only is intellectual property important to national security, it is actually critical.²⁹ Iancu and Kappos point to the importance of new technology like AI and the “towering national security advantages, including in economic and military power” that the country that gains the lead will enjoy.³⁰ As established above, the pursuit of national security comes in the form of a strong military protection of the physical state as well as the promotion of a strong and flourishing economy, something that Iancu and Kappos agree with. Iancu and Kappos discuss that in order for the U.S. to maintain its technological edge, which is imperative in the pursuit of national security, that we “must encourage Americans to make more discoveries in AI and other emerging technologies.”³¹ Their argument is that in order to succeed in this goal, the U.S. has to provide strong IP rights to “incentivize and protect the huge investments required to make those discoveries,” referencing the various policy improvements and changes that China has implemented in their work to protect the intellectual property they create, or steal.³²

In Article I, Section 8, Clause 8, of the United States Constitution, Congress was granted the enumerated power “to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and

²⁹ Andrei Iancu & David J. Kappos, *U.S. Intellectual Property is Critical to National Security* (July 12, 2021), <https://perma.cc/DG4H-S48L>.

³⁰ *Id.* at ¶2.

³¹ *Id.* at ¶3.

³² *Id.*

discoveries.”³³ This inclusion of intellectual property rights in the Constitution initially gave the U.S. a “head-start” in the Industrial Revolution. It allowed the U.S. to shoot to the top of the technological dogpile. However, despite this initial head start, the U.S. has failed to stay up to date with the evolution of patents and types of inventions, and in doing so has created significant barriers for the patentability of certain new technologies, such as AI. Iancu and Kappos argue that the statute that defines the types of inventions eligible for patent protection, 35 U.S.C. § 101, has not effectively changed since the Patent Act of 1893, which has placed a burden upon inventors seeking patents in the realm of AI.³⁴ One of the distinct barriers at the heart of patent law regarding to AI and other software fields in the U.S. is the standard set forth in the Supreme Court case *Alice Corporation Pty. Ltd., v. CLS Bank International*.³⁵

In *Alice Corp.*, the defendant, Alice Corp., was assigned a number of patents that utilized a third-party computer scheme to mitigate settlement risk in a transaction.³⁶ The plaintiff, CLS Bank International, filed suit against Alice Corp., arguing that the patent claims at issue were invalid, unenforceable, or not infringed.³⁷ Alice Corporation counterclaimed alleging infringement, and the district court found in favor of CLS.³⁸ The U.S. Court of Appeals for the Federal Circuit affirmed, and the U.S. Supreme Court granted Certiorari.³⁹ The Supreme Court unanimously affirmed the decision of the Court of Appeals and in Justice Thomas’s majority opinion held that “(1)The abstract idea of an intermediate settlement was not patentable, and (2) method claims requiring generic computer implementation failed to transform the abstract idea

³³ U.S. Const. art. I, § 8, cl. 8.

³⁴ Iancu & Kappos, *supra* note 28.

³⁵ *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2354–55 (2014).

³⁶ *Id.*

³⁷ *Id.*

³⁸ *Id.*

³⁹ *Id.*

of intermediated settlement into a patent-eligible invention.”⁴⁰ In its analysis, the Court used the *Mayo* framework, which necessitated a “two-step” analysis.⁴¹ The first step is to determine whether the patent claim contains an abstract idea or concept, such as an algorithm; if it does not contain one, the claim is potentially patentable, but if it does contain one the court must go to the second step.⁴² In the second step, the court must determine if there is an inventive concept, essentially if the patent adds to the idea “something extra” that would embody some sort of inventive concept or spirit.⁴³

Under *Alice Corp.*, in all cases in which patent-eligibility of a claim must be assessed, the *Mayo* framework must be used within that assessment. However, the application of the second step of the framework, proving that “something extra” inventive concept, was incredibly difficult to explain and took years of court and USPTO decisions.⁴⁴ The end result, and the typical result that is prevalent today for AI patent claims in the U.S., is that most AI claims fall short of the second step of the *Mayo* framework, and are distinguished as “abstract,” despite the usefulness of most algorithmic processes involved in AI.⁴⁵ This, in terms of patentability of AI, creates a substantial roadblock in the process of protecting specific AI research, and is a significant hinderance to both the incentivization for inventors to pursue AI in the U.S. and general protection of any kind of research, development or other progress U.S. inventors make in realm of AI.

⁴⁰ *Id.* at 2350.

⁴¹ *Id.*, citing *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 132 S. Ct. 1289, 182 L. Ed. 2d 321, 2012 U.S. LEXIS 2316, 101 U.S.P.Q.2D (BNA) 1961, 80 U.S.L.W. 4225, 90 A.L.R. Fed. 2d 685, 2012 WL 912952.

⁴² *Id.*

⁴³ *Id.*

⁴⁴ Brian Higgins, *The Role of Explainable Artificial Intelligence in Patent Law*, 31 IPTL L.J. 1, 1-5 (2019) (discussing issues within the patenting of AI).

⁴⁵ *Id.*

Iancu and Kappos point to the lack of adaptation in 35 U.S.C. §101 in adjusting to fit modern definitions and potential language that would broaden U.S. inventor's scope of patentable inventions and the high bar of court decisions like *Alice Corp.* and *Mayo* to prove the issue with American intellectual property policy and precedent.⁴⁶ Despite the "head start" that was built in to the U.S. Constitution, the current state of intellectual property protections in the U.S. indicates a failure to adapt to new and innovative technologies. In that failure, the U.S. runs the risk of falling behind in the technological race. By failing to maintain its pace in the "technological race," the U.S. is also creating a situation where its national security becomes jeopardized since falling behind in this race would mean that competitors are becoming stronger while the U.S. stays stagnant. Iancu and Kappos solution to this problem would be to promote U.S. intellectual property through patent-favorable policy change and addressing intellectual property theft.⁴⁷ In both instances, Iancu and Kappos look to China, as an example of a state supporting intellectual property as well as one of the largest threats to the U.S. regarding intellectual property theft.⁴⁸ Keeping this thought in mind, it may be important to view China as both an example and a threat in the pursuit of national security.

The Role of China in U.S. Intellectual Property Protection

In the 21st century, the competition between U.S. and China is the highlight of nearly any international issue or area in which the two could possibly meet, whether that be sports, politics, or even, most importantly, where the two intersect in the technology race. The competition between the U.S. and China in the technology race has major national security implications, as

⁴⁶ Andrei Iancu & David J. Kappos, *U.S. Intellectual Property is Critical to National Security* (July 12, 2021), <https://perma.cc/DG4H-S48L>.

⁴⁷ *Id.*

⁴⁸ *Id.*

new and innovative technologies such as AI have the potential to drastically increase a country's military power or drastically change its position economically, which in turn could negatively impact countries that they are in competition with. The technology race between the U.S. and China is especially impacted by the intellectual property protections and policies in place for each country as the ability to incentivize and promote intellectual property innovations and inventions through strong patent and trade secret protections is integral for a country's ability to progress in a technology race. While the U.S. initially had a strong lead in the field of intellectual property, as discussed above, China has been able to challenge the U.S.'s dominance for two reasons. The first is China's implementation of intellectual property-friendly policies and institutions and placement of importance in the field. The second is the degree of U.S. intellectual property theft that China is responsible for. In order for the U.S. to regain its lead in the technological race, it will have to view China as both an example to learn from and an enemy to prepare against.

Chinese Intellectual Property

While the U.S. has been a leader in scientific and technological advancements since the American Industrial Revolution, China's advancements in the realm of intellectual property have allowed it to quickly become a major competitor with the U.S. According to former USPTO directors Andrei Iancu and David J. Kappos, the U.S.'s stagnancy in adapting to rapidly changing technologies outside of the scope of original intellectual property policies, coupled with Chinese President Xi Jinping's recognition of intellectual property's critical role in innovation and national security is what has allowed China to "catch up" to the U.S.⁴⁹

⁴⁹ *Id.*

Notably, Chinese innovations have come in the form of increased patenting, providing injunctions for infringement of patented inventions, and creating specialty intellectual property courts that mimic the procedural and set-up of Western courts.⁵⁰ According to *The IP Commission Report: The Report of The Commission on the Theft of American Intellectual Property* of 2013, in fewer than thirty years since the introduction of China's modern patent regime (enacted in 1985), China became the leading country in the world in terms of the number of patents filed in domestic offices.⁵¹ From 1997 to 2011, domestic patent applications in China increased from around 105,000 in 1997 to 1.6 million in 2011.⁵² Notably, while large companies like Huawei and ZTE have led the way in China's surge in patenting, many smaller companies have also been taking advantage of various government incentives like tax breaks and financial rewards and joined in on the patenting frenzy.⁵³ The Chinese government's incentive plan would appear to be central to the success that they have enjoyed. By incentivizing smaller companies to expand into patenting both domestically and abroad, China has been able to bring in smaller companies who otherwise would not have either been able to enter this field or otherwise found the reward insufficient to risk entering the market.

Direct governmental incentivization is what Iancu and Kappos seem to be referencing in their overview of the current issues the U.S. faces in the intellectual property aspect of the modern technology race. While the Chinese government has been able to incentivize its companies, both large and small, to essentially invest in the Chinese patent "movement" through various policy and government actions, the U.S. government has been stagnant and unmoving in

⁵⁰ *Id.*

⁵¹ Commission on the Theft of American Intellectual Property, *The IP Commission Report*, 34, 2013. <https://perma.cc/2SYQ-92EU>.

⁵² *Id.*

⁵³ *Id.*

the face of new technological innovations and ideas. In following the logic of Iancu and Kappos, the Chinese government has been able put into place the ideal intellectual property scenario; and to avoid being left in the dust, the U.S. government should make an effort to follow suit; otherwise, U.S. national security is in dire straits economically and potentially militarily.

While China's current policies may have expanded their patent capabilities and increased their global intellectual property standing, the same types of policies may not be able to be incorporated in the U.S., much to the dismay of advocates for quick intellectual property policy changes. The 2013 IP Commission Report made a point to address that while China has become a global leader in patents and has made substantial intellectual property growth over the last few decades, the overall numbers indicate innovative activity.⁵⁴ However, the IP Report suggests that the incentivization is geared towards pure patent production rather than innovation.⁵⁵ Part of that evidence is the government incentives discussed above, and that "this ecosystem of incentive provides tenure to professors, hukou (residence) permits to students and workers, cash bonuses and rebates to filers, and even bonuses to patent examiners based on the number of patents approved."⁵⁶ In short, the incentives that the Chinese government is supplying are proving to simply mass produce patent applications rather than actual inventive, innovation. The relevance that this plays with respect to similar policies or actions being taken in the U.S. comes into play with the existence of *Alice Corp.* and the *Mayo* framework analysis.

Under *Alice* and *Mayo*, courts look to the inherent effect of a patent claim's ability to introduce a non-abstract, "inventive concept" that overall "adds something extra" to the concept

⁵⁴ *Id.* at 33.

⁵⁵ *Id.*

⁵⁶ *Id.* at 34.

or idea that is being brought forth for a patent claim.⁵⁷ The public policy goal behind this framework is to prevent abstract concepts that are universal from being monopolized for profit, but another distinct policy goal is to induce actual, inherent “inventing” or the creation of new and innovative technology. That policy goal runs counter to the results that seem to stem from the governmental incentive policies and general “ecosystem of incentive” at work in China. Due to this, governmental incentive policies that seek to reward just producing as many patents as possible, like the ones that are in place in China, would most likely have issues being approved in the U.S.

Intellectual Property Theft

Intellectual property theft, as the name suggests, is the appropriation of any type of intellectual property belonging to another in violation of criminal laws designed to protect that property.⁵⁸ Within intellectual property theft as a whole, there are four main types of theft: (1) patent violations, (2) trade-secret theft, (3) trademark violations, and (4) copyright infringement.⁵⁹ The focus of this article relates to patent violations and trade-secret theft. According to Professor Paul Goldstein of Stanford Law, the oldest forms of appropriation of intellectual goods were film, record and software and piracy, and counterfeiting of luxury goods and pharmaceuticals.⁶⁰ As intellectual property was “injected” into the trade process, Goldstein illustrates the pattern of United States Trade Representative (USTR) complaints of Chinese failure to halt piracy of U.S.- created goods: the countries would enter into a memorandum of understanding, the USTR would identify continued violations and a new memorandum would be

⁵⁷ *Alice Corp.*, 134 S. Ct. 2347.

⁵⁸ Bureau of Justice Assistance, <https://perma.cc/A5NG-5XZB> (last visited Oct. 12th, 2021).

⁵⁹ Commission on the Theft of American Intellectual Property, *supra* note 50.

⁶⁰ Interview with Paul Goldstein, IP law expert, Stanford Law Sch., (April 10th, 2018).

entered into and so on and so forth.⁶¹ In order to compete with less expensive pirated foreign goods, China's domestic copyright industries pressed the Chinese government to fortify their intellectual property process on its own.⁶² With the Chinese patenting infrastructure set up the way it is, as described above, the two forms of Chinese appropriation of intellectual property that have come to the forefront are theft, mostly cyber-theft, of valuable trade secrets and the technological transfers required of American and foreign companies to do business on Chinese soil.⁶³

In 2013, the Commission on the Theft of American Intellectual Property investigated the scale and complexities of the international theft of intellectual property in the U.S. Within this report, the Commission found that when compiling the estimated value of lost sales, stock assets, investments, and other dimensions, the total annual losses within the U.S. due to stolen IP are “in the hundreds of billions of dollars.”⁶⁴ Critics of the Commission's report may point to the lack of an exact calculation of loss and indicate that this takes away from the Commission's findings. In its defense, the Commission maintained that because loss is measured in different ways across different sectors, individual companies are disincentivized to report their losses, and a variety of different surveys are used to poll companies on their losses that an exact number is impossible to calculate.⁶⁵ Despite this lack of an exact estimate, the loss of “hundreds of billions of dollars” is an enormous impact upon a country's economy foremost, but additionally the loss of critical intellectual property in both the private and public hemispheres of the U.S. is incredibly important to the country's state of national security. As expressed above, damage done to the

⁶¹ *Id.*

⁶² *Id.*

⁶³ *Id.*

⁶⁴ *Id.* at 23.

⁶⁵ Commission on the Theft of American Intellectual Property, *supra* note 50.

U.S.'s economy is equally disastrous to the state of its national security as losing access or patent rights to intellectual property is directly related to national security.

In the same 2013 report, the Commission on the Theft of American Intellectual Property noted that China played a large threat as both an intellectual property competitor as well as a direct proponent of intellectual property theft.⁶⁶ In terms of patents specifically, the Commission referenced a 2011 study by the U.S. International Trade Commission that found that U.S. firms estimated losses to Chinese patent infringers topped \$1.3 billion in 2009.⁶⁷ In the same study, the U.S.T.C. noted that a significant number of these companies were forced to divert funds over from Research and Development over to their legal departments.⁶⁸

While the losses estimate in 2009 is itself a major economic blow to the U.S., the necessary diversion of funds away from the various companies' Research and Development departments further hampers the U.S.'s pursuit of technological innovations. The Commission noted that in industries with high levels of Research and Development expenditures, such as biotechnology, high-technology, pharmaceuticals, etc., companies or firms in those industries typically rely on the patent system's protection in order to recoup expenses and realize profit from their products and inventions.⁶⁹ Through China's patent infringement, not only are the U.S.'s current industries and interests harmed directly, but the ability to focus on innovation and potential future prospects, innovations, and the ability to invent are being hampered as well.

Notably, on August 12th, 2020, then-head of the National Security Division at the Department of Justice, John Demers, publicly acknowledged the national security threats

⁶⁶ *Id.*

⁶⁷ *Id.*

⁶⁸ *Id.*

⁶⁹ Commission on the Theft of American Intellectual Property, *supra* note 50.

associated with Chinese intellectual property theft.⁷⁰ In Demer's acknowledgement, he reinforced that China was the entity predominantly responsible for the theft of U.S. intellectual property, indicating that over 80% of all cases charged as economic espionage and 60% of all trade secrets cases involve China.⁷¹

Moving Forward: Strengthening Intellectual Property Policies & Laws

Intellectual property is clearly an important and integral component to the national security of the United States. Despite the U.S.'s historical dominance of the technological race, a lack of intellectual property policy innovation or modernization within the U.S. has allowed other global leaders such as China to "catch-up" in this race. The U.S.'s tough patenting standard stemming from *Alice Corp.* has created an incredibly high bar for innovation and invention in rising new technologies, especially in regard to difficult concepts involving algorithms like AI.

AI, and technologies like it, are the crux of a new age of technological innovation in the 21st century, and the countries that are unable to develop a foothold in this growing area of technology will face significant disadvantages economically. Additionally, the potential militaristic or hostile uses of this technology represents a significant risk for the U.S.⁷² Alongside the U.S.'s rigidity in its intellectual property policy growth, the rate of intellectual property policy change and seemingly accepted intellectual property theft in China has backed the U.S. into a corner. In order to avoid falling behind in the modern technological race and make secure it's national security, the U.S. seemingly has no choice but to implement some form of intellectual policy change.

⁷⁰ David H. Laufman, Joseph M. Casino, Michael J. Kasdan, *The Department of Justice's National Security Division Chief Addresses China's Campaign to Steal U.S. Intellectual Property*, 11 Nat. L. Rev. 288 (2021).

⁷¹ *Id.*

⁷² NAT'L SEC. COMM'N ON A.I., FINAL REPORT [1] (2021).

The National Security Commission on Artificial Intelligence

On August 13th, 2018, the National Security Commission on Artificial Intelligence (“NCSAI” from here on out) was established under section 105 of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 in order to “review advances AI, related machine learning developments, and associated technologies.”⁷³ Within this review, the NSCAI “consider[ed] the methods and means necessary to advance the development of AI, machine learning, and associated technologies by the United States to comprehensively address the national security and defense needs of the United States.”⁷⁴ The NSCAI’s 2021 “Final Report” reflects the Commission’s conclusions and recommendations for the U.S. In regard to AI, notably, the Final Report includes key points in U.S. intellectual property policy and the threat that Chinese intellectual property policy has presented to the U.S.

The National Security Threat of Artificial Intelligence

AI and its applications are transforming existing threats, creating new classes of threats, and emboldening state and non-state adversaries of the U.S. to exploit the vulnerabilities of the open society that the U.S. has thrived on for decades.⁷⁵ The NSCAI stated that the way that AI systems extend the “range and reach of adversaries” into the U.S. is comparable to ways that the missile age and terrorism brought threats “closer to home.”⁷⁶ The NSCAI summarized five core AI related threats that have either already been, or can be expected to be developed and used against the U.S.

⁷³ H.R. 5515, 115th Cong. §1051(a)(1).

⁷⁴ H.R. 5515, 115th Cong. §1051(b)(1).

⁷⁵ NAT’L SEC. COMM’N ON A.I., FINAL REPORT [47] (2021).

⁷⁶ *Id.*

The first AI-related threat to the U.S. is “AI-Enabled Operations.”⁷⁷ According to the NSCAI, “AI and associated technologies will increase the magnitude, precision, and persistence of adversarial information operations,” mostly through the production of malign information based off individual’s online profiles and the embedding of that information into online platforms.⁷⁸ The stark reality of the situation is quite foreboding; a country’s ability to interject a host of malign software and information into the general populace’s data stream and social media creates chaos and a multitude of false realities. This alone threatens U.S. national security, and as the NSCAI suggests, appropriate actions must be taken to address it.

The second AI-related threat from the NSCAI’s Final Report is “Data Harvesting and Targeting of Individuals.”⁷⁹ The NSCAI’s driving point within this topic is that AI allows for a systematic effort to harvest data on U.S. companies, individuals, and the government due to the broad circulation of personal data.⁸⁰ Due to the intertwining of personal data and commercial innovation, any type of data incursion makes it impossible for individuals to keep aspects of their personal life private.⁸¹ While this data incursion is a clear national security threat, it also lends credence to intellectual property theft issues, as theft of personal data could logically be done alongside any theft or make it easier to gain access to intellectual property.

The third AI-related threat from the NSCAI’s Final Report is “Accelerated Cyber Attacks.” The NSCAI points out that even before enhancing malware with AI, the U.S. already struggles to combat malicious cyber attacks from adversaries, and that the advent of AI-enhanced malware will make “cyber attacks more precise and tailored” through a compilation of new and

⁷⁷ *Id.* at 48.

⁷⁸ *Id.*

⁷⁹ NAT’L SEC. COMM’N ON A.I., FINAL REPORT [49] (2021).

⁸⁰ *Id.*

⁸¹ *Id.*

old “algorithmic means to automate, optimize, and inform attacks.”⁸² The 2017 NotPetya cyber-attack caused multibillion-dollar global damage with the use of “basic automated malware.” With advancements in the field over the years, the damage of a similar attack with further enhanced AI could be staggering.⁸³ In order to combat this threat, the NSAIC noted that while the defensive applications of AI bring the promise to improve national cyber defenses, it cannot defend “an inherently vulnerable digital infrastructure.”⁸⁴ Notwithstanding the NSAIC’s recommendations in regard to exact cyber measures that should be taken, a strong focus on revamping the U.S.’s ability to both research and develop its own AI capabilities and protect that information.

The fourth AI-related threat from the NSCAI’s Final Report is “Adversarial AI.” According to the NSCAI, new artificial systems represent a unique target for attack, with a number of documented attacks involving “evasion, data poisoning, model replication, and exploiting traditional software flaws to deceive, manipulate, compromise, and render AI systems ineffective.”⁸⁵ While the threat is emerging, the U.S. is notably lacking in their investment into research and development on how to protect their AI. The NSCAI looked to recent surveys to indicate that only “three of 28 organizations” with AI capabilities have the ability to make their systems secure from outside theft or hacking.⁸⁶ While the NSCAI’s immediate recommendations specifically related to this threat are concerned more narrowly to creating a national framework for artificial assurance, there clearly needs to be work done in the intellectual

⁸² *Id.* at 50.

⁸³ *Id.*

⁸⁴ *Id.* at 51.

⁸⁵ *Id.* at 52.

⁸⁶ *Id.*

property field in order to both encourage and incentivize the necessary improvements needed to protect AI systems in the U.S.

The fifth, and final, AI-related threat from the NSCAI's Final Report is "AI-Enabled Biotechnology." The NSCAI analysis of this threat revolves around the idea that biology "is now programmable," referencing technology like the CRISPR gene editing tool and the ability now to make massive innovations in biotechnology because of AI and "massive computing power."⁸⁷ Here, the NSCAI argues that U.S. competitors such as China and Russia are comparatively likely to take more "risk-tolerant actions and conform less rigidly to bioethical norms and standards."⁸⁸ Again, while the overwhelming importance in the addressment of this threat is directly concerned with its exact national security usage and dangers, it is an area in which the U.S. would greatly benefit from significant development in its intellectual property policy.

While the primary discussion regarding these threats is in regard to the U.S.'s most pressing concerns in the context of direct national security application, there are key discussions that delve into the overarching inadequacies within U.S. intellectual property policy. Through both explicit language and the penumbras of language used, the NSCAI demonstrated in their summarization of these threats that the U.S. needs to implement strategies to make policy changes. In Chapter 12 of the Final report, the NSCAI recommended their implementations.

Intellectual Property Recommendations

In Chapter 12 of the Final Report, the NSCAI moved to directly acknowledge the state of U.S. and global intellectual policy and provide recommendations in order to solve perceived

⁸⁷ *Id.*

⁸⁸ *Id.* at 53.

issues.⁸⁹ While the U.S. has failed to recognize the importance of intellectual property in relation to national security and develop comprehensive policies to incentivize investments, China has taken advantage of this lapse and quickly caught up in the technology race, specifically with AI. Currently, the U.S. stands at the precipice of losing its place as the leader of the global technology race, and this scenario has come as a result of external and internal factors.

First, U.S. courts have severely restricted what types of “computer-implemented and biotech-related inventions” can be protected under U.S. patent law.⁹⁰ For example, the *Alice Corp.* standard and *Mayo* framework discussed earlier are incredibly harsh on the patenting of ideas like algorithms which are integral to the creation and implementation of AI. When inventors are unable to pursue patent protection for their AI innovations, they can seek trade secret protection, but trade secrets do not readily promote innovation markets.⁹¹

Next, China has met its own internal goal of increasing its total quantity of patent applications and actual issued patents, especially regarding AI. In 2019, the China National Intellectual Property Administration (CNIPA) filed three times as many “invention” patent applications as the number of utility patent applications filed by the USPTO.⁹² The NSCAI also notes that China has outnumbered the U.S. in AI patent applications in recent years, and that China is “frequently identified” as the current leader in domestic patent applications for AI. This could only be referred to as Chinese domination of AI patenting and is partially attributable to the U.S.’s tough patent application process for AI and its components.

⁸⁹ NAT’L SEC. COMM’N ON A.I., FINAL REPORT [465] (2021).

⁹⁰ *Id.* at 201.

⁹¹ *Id.*

⁹² *Id.* at 202.

The next factor the NSCAI addresses is that “China’s prolific patent application filings” may hurt U.S. innovators by creating a massive collection of “prior art,” which is the term used to describe the knowledge or other patented works already in existence used to determine whether a patent claim is obvious.⁹³ To prove that obviousness, the “prior art” must satisfy one of the following conditions: “(1) the reference must be from the same field of endeavor, or (2) the reference must be reasonably pertinent to the particular problem with which the inventor is involved.”⁹⁴ As discussed in the paragraph above and earlier in this article, China has increased the pure quantity of its patent applications by a staggering degree; by introducing so many patents, the “prior art” for which the USPTO must review for similar new patents has increased tremendously as well. The logical effect will be to greatly impede the ability of the USPTO to evaluate and approve or disapprove U.S. patents at a high rate, or at least not as high a rate as China. Additionally, the NSCAI points out that this influx of “prior art” will simply make it more difficult to obtain patents because more “prior art” has already been patented, there are bound to be higher chances of similarities appearing between already created patents and new U.S. applications.⁹⁵

Next, the fourth factor the NSCAI addresses is that China’s companies have been “identifying too many patents as ‘standard-essential’ in standards development organizations” and that they must be practiced to comply with “a technical standard.”⁹⁶ This creates the scenario, the NSCAI argues, in which China can further its global narrative of winning the technology race for certain technologies and prompt other countries to adopt China’s

⁹³ *Raytheon Techs. Corp. v. Gen. Electric Co.*, 993 F.3d 1374 (Fed. Cir. 2021).

⁹⁴ *Wonderland Nurserygoods Co. v. Thorley Indus., L.L.C.*, 988 F. Supp. 2d 479 (W.D. Pa. 2013), *aff’d*, 644 F. App’x 1011 (Fed. Cir. 2016).

⁹⁵ NAT’L SEC. COMM’N ON A.I., FINAL REPORT [204] (2021).

⁹⁶ *Id.*

technologies in their own infrastructures.⁹⁷ A scary secondary result is that U.S. companies may be forced to “pay billions in royalties to China’s companies” or face claims and litigation that they were willfully infringing on those companies’ patent rights.⁹⁸

The fifth factor the NSCAI addresses is that the U.S.’s “lack of explicit legal protections for data or express policies on data ownership” may actually lead to the hindering of innovation and collaboration as technologies evolve.⁹⁹ The argument behind this is that the absence of any explicit data protection de-incentivizes companies or similar parties from making investments to develop data sets that are critical for the U.S.’s development in areas such as “machine learning and AI systems.”¹⁰⁰ The overall risk of an up-and-coming market, coupled with limited amounts of protection for input, makes companies less likely to engage within this new market. The NSCAI also notes that the absence of data governance policies could also make companies unwillingly to enter into “public-private partnerships” which are “crucial” for the creation of technological innovations.¹⁰¹

Through the research and analysis presented in Chapter 12 of its Final Report, the NSCAI has demonstrated that the current state of intellectual property policy and protection in the U.S. is lacking. In addition to this, China’s prioritization of its own intellectual property policy and theft of U.S. intellectual property has created a situation in which the U.S.’s position as a leader in technology is on the precipice of usurpation, especially in the groundbreaking field of AI. In order to prevent this, the NSCAI developed a recommendation to alleviate the pressure on the U.S.’s current position. The recommendation, wholly, is to “develop and implement national IP

⁹⁷ *Id.*

⁹⁸ *Id.* at 205.

⁹⁹ *Id.*

¹⁰⁰ *Id.*

¹⁰¹ *Id.*

policies to incentivize, expand, and protect AI and emerging technologies.”¹⁰² While there are significant recommendations to several sources, the highlighted recommendation is that the U.S. President issue an Executive order to recognize intellectual property as a national priority and require the development of a comprehensive plan to reform and create new intellectual policies designed to address the threat of AI and similar technologies and the U.S.’s current inept policies.¹⁰³ This plan would be left to the direction of the U.S. Vice President, Secretary of Commerce for Intellectual Property, and the Director of the USPTO to identify the weak areas of U.S. intellectual property policies and suggest reforms.¹⁰⁴ Additionally, the NSCAI recommends that the Department of Justice advise courts on ensuring consistency on patentability decisions and eliminate “confusing, inconsistent, or overly restrictive patentability decisions.”¹⁰⁵

Former USPTO directors, Andrei Iancu and David Kappos, have expressed their support of the NSCAI’s recommendations.¹⁰⁶ As discussed earlier, Iancu and Kappos wrote on the threat that the U.S. was facing as a result of China’s nationally-centered intellectual policy drive and the U.S.’s failure to adapt to new and evolving technologies in the field of intellectual property.¹⁰⁷ Within that same piece, Iancu and Kappos argue that the recommendations from the NSCAI to elevate U.S. intellectual policy reform to a national priority and integrating it into national security strategies are steps in the right direction to revamp U.S. innovation.¹⁰⁸

¹⁰² NAT’L SEC. COMM’N ON A.I., FINAL REPORT [207] (2021).

¹⁰³ *Id.*

¹⁰⁴ *Id.*

¹⁰⁵ *Id.*

¹⁰⁶ Andrei Iancu & David J. Kappos, *U.S. Intellectual Property is Critical to National Security* (July 12, 2021), <https://perma.cc/DG4H-S48L>.

¹⁰⁷ *Id.*

¹⁰⁸ *Id.*

Conclusion & Recommendation

Since the conception of the United States as a Nation, it has enjoyed incredible rights and privileges that have allowed it to prosper economically. Article I, Section 8, Clause 8 of the Constitution has guaranteed U.S. citizens certain intellectual property rights that have allowed Americans to innovate, invent, and move forward in all aspects, but especially in technology.¹⁰⁹ Despite this, the U.S. has not been able to keep up with the evolution of technology in terms of patentability rights or protection. All the while, competitors like China have strengthened their intellectual property policies and recognized the importance of intellectual property in the scope of national security. Coupled with this, the U.S. is plagued with seemingly state-sanctioned theft out of adversaries like China that cost the U.S. billions of dollars and disincentivize private U.S. companies from attempting to innovate or invent. In order to combat this dire threat, the U.S. needs to make major changes in how it sees intellectual property and how it encourages invention and innovation within the U.S. In the NSCAI's report on AI development, the Commission recommended a number of U.S. policy changes, specifically in the intellectual property field, to address these very issues. The result of these recommendations, as they are outlined above, would be to strengthen U.S. intellectual property policy, make intellectual property an issue within the scope of U.S. national security, and focus on long held standards like *Alice Corp.* and *Mayo* which is so drastically preventing the U.S. from advancing in the new age of technology. The goals of the NSCAI's recommendations are to bring U.S. intellectual property policy to the forefront of U.S. concern, and in doing so, the U.S.

¹⁰⁹ U.S. Const. art. I, § 8, cl. 8.

will be able to finally make real progress in intellectual property and regain the lead in the increasingly important technology race.