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**1AC — Innovation**

**Advantage 1 is Innovation —**

**Standards-Setting Organizations** [SSO’s] **are industry members who jointly establish standards for information tech defined by the adoption of standard-essential patents** [SEP’s]**, which are licensed to companies who wish to implement the tech in their product, called implementers, on Fair, Reasonable, and Non-Discriminatory** [FRAND] **terms. Current standards promote price gouging, FRAND enforcement is critical.**

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I. Standard Setting and the Competitive Process

The **fundamental economics** in the **information technology** sector, driven by **network effects**, implies that there is **enormous value** associated with establishing compatibility standards. Popular standards include the mobile broadband standards used in cell phones, which are established by the 3rd Generation Partnership Project (3GPP), and the Wi-Fi technology for wireless local area networks, which is enabled by the 802.11 standard established by the Institute of Electrical and Electronics Engineers (IEEE).4

There are many SSOs, and their rules and procedures differ considerably. In addition to IEEE, leading SSOs include the International Organization for Standardization (ISO), the International Telecommunication Union (ITU), the European Telecommunications Standards Institute (ETSI), the Internet Engineering Task Force (IETF), and the World Wide Web Consortium (W3C).5 SSOs generally establish standards by holding a series of committee meetings among industry participants. These meetings culminate in a vote on a technical specification that describes what features or attributes a product must have in order to comply with the standard. Most SSOs are open to all industry participants and seek to operate on a consensus basis, applying certain voting rules. SSOs do not normally engage in patent licensing, nor do they specify how patent royalties will be divided up among patent holders. They leave that to their members, which in some cases form patent pools to address these issues.6

SSOs adopt specific policies relating to intellectual property rights (IPRs).7 These IPR policies are generally intended to enable the SEP holders to obtain reasonable royalties for licensing their patents, while prohibiting them from charging excessive royalties after other industry participants have committed to the standard. At that point, firms committed to implementing the standard— which we call “implementers”—would find it **very costly** to avoid using the patented technology. For this purpose, most SSOs require SEP owners to license their SEPs on FRAND terms.8

FRAND policies are especially necessary because negotiations between SEP holders and implementers generally **take place only after** the implementers have used and infringed the technologies claimed by the SEPs. Standards involving information and communications technology can involve hundreds or even **thousands of SEPs**, many with **uncertain boundaries** for infringement. In addition, a time lag exists between patent application and patent issuance. For these and other reasons, it is **impractical** for implementers to enter into negotiations for patent licenses with all SEP owners prior to the establishment of a standard and to their implementation of it.9

The fact that patent negotiations generally do not take place until after implementers have used and infringed the technologies has several critical implications. First, at the time of negotiation, implementers are **locked into the standard** and the technologies claimed by the SEPs—that is, the **cost to switch** to an alternative technology or standard at that point—ex post—is **much greater** than it was ex ante, before the patented technology was first included in the standard. Ex post, the patent holder is no longer competing to have its technology included in the standard, nor is it competing to have implementers of the standard use its technology. Instead, because the patent holder owns an asset that is essential to the standard, implementers have no choice but to use the patented technology.

If the standard is commercially successful, implementers are willing to pay a much larger royalty for use of the patented technology than they would have paid ex ante, when the SEP holder faced competition from other technologies. In these circumstances, the SEP holder can be said to have obtained **monopoly power** in the market in which the patented technology is licensed for use in implementing the standard.10

Second, because of lock-in and the implementer’s ongoing infringement, the **potential for litigation looms large** in licensing negotiations. In effect, the parties are negotiating about how to settle an infringement suit, and that negotiation is **heavily influenced** by their predictions as to what the court will do if they cannot agree. This situation is not unique to SEPs; it arises frequently when firms are faced with patent infringement claims for products they have independently developed or technologies they have inadvertently infringed. Patent law addresses such instances by specifying that patent holders are entitled to “**reasonable royalties**,” defined as the royalties that the parties would have negotiated prior to the infringement and thus prior to lock-in.11 Those hypothetical ex ante royalties reflect the market value of the patent license. Notwithstanding the law’s embrace of this principle, however, as a practical matter, patent holders are **generally able to recover more** than the **ex ante value** of the patent when litigation occurs after the implementers are locked in. Further, negotiations in the shadow of litigation after lock-in tend to **result in royalties in excess** of the ex ante or **market value** of the patented technology.12

Third, the shadow of litigation is **particularly problematic** in the communications and technology sector, in which products typically include hundreds or **thousands** of **patented technologies**. A court-ordered injunction involving such products would deprive the implementer of not only the value of the technology covered by the patent-in-suit, but also the value of the **entire product**.13 Implementers that are forced to bear the risk of an injunction are thus **induced to agree to royalties** greater than those that would be **appropriate** if only the value of the patented technology were at stake. Those royalties **systematically provide** SEP holders with **excessive compensation** in comparison with the benchmark of ex ante royalties.

These implications of lock-in and ex post dealings are well-understood: they represent an example of the **general concept** of **lock-in** and **opportunism** developed by Oliver Williamson.14 The Federal Circuit has also recognized the market distortions caused by the inclusion of patented technologies in public standards and the resulting danger of patent holdup involving SEPs.15

For these and other reasons, the SEP holder has ex post monopoly power that, if left unchecked, would enable it to obtain royalties **far in excess** of the royalties that it could earn in a competitive market.16 To address this common problem and limit ex post opportunism by SEP holders, SSOs typically require participants that own SEPs to make certain FRAND commitments. In particular, by requiring a commitment to license on “fair and reasonable” terms, the FRAND requirement aims to prevent, or at least reduce, the **extent of monopoly pricing** by SEP holders. And by requiring a commitment to license on “nondiscriminatory” terms, the FRAND requirement can prevent SEP holders from **extracting monopoly premiums** by selective licensing or, more important, migrating their monopoly power from the FRAND-regulated market to unregulated standard-implementing product markets by licensing to only one or a few implementers or licensing to selected implementers on discriminatorily favorable terms.

**Patent holdup is accentuated by the Ninth Circuit’s recent decision in *FTC v. Qualcomm* that permits ICT firms to engage in innovation-stifling conduct with antitrust impunity.**

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Standards can enhance **competition** and **consumer choice**, but they also **massively inflate** the **value** of **patents** deemed **essential** to the standard, and give their owners the power to **sue companies** that implement the standard for **money damages** or **injunctions** to block them from using their SEPs. When standards cover critical features like wireless connectivity, SEP owners wield a huge amount of **“hold-up” power** because their patents allow them to effectively **block access** to the **standard** altogether. That lets them charge **unduly large tolls** to anyone who wants to implement the standard.

To minimize that risk, standard-setting organizations typically require companies that want their patented technology incorporated into a standard to promise in advance to license their SEPs to others on fair, reasonable, and non-discriminatory (FRAND) terms. But that promise strikes at a **key tension** between antitrust and patent law: patent owners have **no obligation** to let anyone use technology their patent covers, but to get those technologies incorporated into standards, patent owners usually have to promise that they will give **permission** to anyone who wants to implement the standard as long as they pay a reasonable license fee.

Qualcomm is one of the most **important** and **dominant** companies in the **history** of **wireless** communication standards. It is a multinational conglomerate that has owned patents on every major wireless communication standard since its first CDMA patent in 1985, and it **participates** in the **s**tandard-**s**etting **o**rganization**s** that define those standards. Qualcomm is somewhat unique in that it not only **licenses SEPs**, but also **supplies** the **modem chips** used by a wide range of devices. These include chips that **implement** wireless communication **standards**, which lie at the **heart** of every mobile **computing device**.

Although Qualcomm promised to license its SEPs (including patents essential to CDMA, 3G, 4G, and 5G) on FRAND terms, its conduct has to many looked **unfair**, **unreasonable**, and **highly discriminatory**. In particular, Qualcomm has drawn scrutiny for bundling tens of thousands of patents together—including many that are **not** standard-**essential**—and offering portfolio-only licenses no matter what licensees actually **want** or **need**; refusing to sell modem chips to anyone without a SEP license and threatening to **withhold chips** from companies trying to **negotiate** different license terms; **refusing** to license anyone other than original-equipment manufacturers (OEMs); and insisting on **royalties** calculated as a **percentage** of the **sale price** of a handset sold to end users for hundreds of dollars, despite the minimal contribution of any particular patent to the retail value.

In 2017, the U.S. Federal Trade Commission [sued](https://www.ftc.gov/news-events/press-releases/2017/01/ftc-charges-qualcomm-monopolizing-key-semiconductor-device-used) Qualcomm for violating both sections of the Sherman Antitrust Act by engaging in a number of anticompetitive SEP licensing practices. In May 2019, the U.S. District Court for the Northern District of California agreed with the FTC, identifying numerous instances of Qualcomm’s unlawful, anticompetitive conduct in a comprehensive [233-page opinion](https://www.eff.org/document/ftc-v-qualcomm-district-court-opinion). We were pleased to see the FTC take action and the district court credit the overwhelming evidence that Qualcomm’s conduct is corrosive to market-based competition and threatens to cement Qualcomm’s dominance for years to come.

But this month, a panel of judges from the Court of Appeals for the Ninth Circuit unanimously [overturned](https://www.eff.org/document/ninth-circuit-opinion-ftc-v-qualcomm) the district court’s decision, reasoning that Qualcomm’s conduct was “hypercompetitive” but not “anticompetitive,” and therefore not a violation of antitrust law. To reach that result, the Ninth Circuit made the patent grant more powerful and antitrust law weaker than ever.

According to the Ninth Circuit, patent owners don’t have a duty to let anyone use what their patent covers, and therefore Qualcomm had no duty to license its SEPs to anyone. But that framing requires **ignoring** the **promises** Qualcomm made to license its SEPs on **reasonable** and **non-discriminatory** terms—promises that courts in this country and around the world have **consistently** enforced. It also means ignoring antitrust principles like the essential facilities doctrine, which limits the ability of a monopolist with **hold-up power** over an **essential facility** (like a port) to **shut out** rivals. Instead, the Ninth Circuit held rather simplistically that a duty to deal could arise only if the monopolist had provided access, and then reversed its policy.

But even when Qualcomm restricted its licensing policies in critical ways, the Ninth Circuit found reasons to approve those restrictions. For example, Qualcomm stopped licensing its patents to chip manufacturers and started licensing them only to OEMs. This had a major benefit: it let Qualcomm charge a much **higher royalty rate** based on the **high retail price** of the end user devices, like smartphones and tablets, that OEMs make and sell. If Qualcomm had continued to license to chip suppliers, its patents would be “**exhausted**” once the chips were sold to OEMs, extinguishing Qualcomm’s right to assert its patents and control how the chips were used.

Patent exhaustion is a century-old doctrine that protects the rights of consumers to use things they buy without getting the patent owner’s permission again and again. Patent exhaustion is important because it **prevents price-gouging**, but also because it protects **space** for **innovation** by letting people **use things** they buy **freely**, including to build innovations of their own. The doctrine thus helps patent law serve its underlying goal—promoting economic **growth** and **innovation**. In other words, the doctrine of exhaustion is baked into the patent grant; it is not optional. Nevertheless, the Ninth Circuit wholeheartedly approved of Qualcomm’s efforts to avoid **exhaustion**—even when that meant **cutting off** access to **previous licensees** (chip-makers) in ways that let Qualcomm charge **far more** in **licensing fees** than its SEPs **could possibly** have **contributed** to the **retail value** of the **final product**.

It makes **no sense** that Qualcomm could **contract around** a fundamental principle like patent **exhaustion**, but at the same time **did not assume** any **antitrust duty** to deal under these circumstances. Worse, it’s **harmful** for the **economy**, **innovation**, and **consumers**. Unfortunately, the kind of harm that antitrust law recognizes is limited to harm affecting “competition” or the “competitive process.” Antitrust law, at least as the Ninth Circuit interprets it, doesn’t do nearly enough to address the **harm** downstream consumers experience when they pay **inflated** prices for high-tech devices, and miss out on **innovation** that might have developed from fair, reasonable, and non-discriminatory licensing practices.

We hope the FTC sticks to its guns and asks the Ninth Circuit to go en banc and reconsider this decision. Otherwise, antitrust law will become an even **weaker weapon** against **innovation-stifling conduct** in **technology markets.**

**Weakened antitrust enforcement emboldens firms to follow Qualcomm’s lead, which collapses FRAND integrity.**

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While the FRAND process has been highly productive, it is also **fragile**. Firms are tempted to make commitments at the beginning when the incentive to join is large, but **renege** on them **later** when they can profit by doing so. At least in this particular case, private FRAND enforcement **had not worked** very well. Qualcomm had been able to violate FRAND commitments in order to **exclude rivals** and obtain **higher royalties** than FRAND would permit, largely with **impunity**. Other firms will very likely **follow Qualcomm’s lead**. If that happens the **FRAND system** will **fall apart**, doing **irreparable injury** to the modern wireless telecommunications network or, at the very least, **diminishing** the **leadership role** of the United States in preserving effective **network competition**.

While governments can be heavily involved in standard set-ting,9 the implementation of technical standards in information technologies is largely the work of private actors. Government involvement is limited mainly to enforcement of contract, intellectual property, or antitrust law. As private actors, those involved in standard setting or compliance are fully subject to the federal antitrust laws.

This Article addresses one question: when is an SSO participant’s violation of a FRAND commitment an antitrust violation, and if it is, of what kind and what are the implications for remedies? It warns against two extremes. One is thinking that any violation of a FRAND commitment is an antitrust violation as well. In the first instance FRAND obligations are contractual, and most breaches of contract do not violate any antitrust law. The other extreme is thinking that, because a FRAND violation is a breach of contract, it cannot also be an antitrust violation. The question of an antitrust violation does not de-pend on whether the conduct breached a particular agreement but rather on whether it caused competitive harm. This can happen because the conduct restrained trade under section 1 of the Sherman Act, was unreasonably exclusionary under section 2 of the Sherman Act, or amounted to an anticompetitive condition or understanding as defined by section 3 of the Clay-ton Act.10 The end goal is to identify practices that harm com-petition, thereby injuring consumers.

The Ninth Circuit’s Qualcomm decision will make antitrust violations in the context of FRAND licensing much more **difficult to prove**, even in cases where **anticompetitive behavior** and consumer harm **seem clear**.11 Indeed, in this case the court itself acknowledged the harm to consumers but appeared to think that they were not entitled to protection.12 If this decision stands, FRAND obligations will to a **larger extent** have to be settled through private litigation and the federal antitrust enforcement agencies will have a **diminished role**. Anticompetitive behavior by one firm that is **not effectively disciplined** will lead **others** to do the **same thing**.

#### A trusted and credible system for ICT innovation is critical to rapid tech diffusion — absent FRAND, the system will collapse.

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It is easy to take a **pessimistic view** about whether the system will **break**. If the current trend continues, the system is **likely** to break at **some point** for the simple reason that companies will **not trust it** anymore. The series of legal disputes witnessed over the past years – sometimes referred to as the “smartphone patent wars” – has been fodder for a pessimistic reading of “the two tales of SEPs”. While it is common in the business world that disputes over patents and licenses are settled in courts, various SEP disputes have revealed **problematic** aspects of the SEP market that are different from those disputes that follow the normal stream of business and contracts. Often, the SEP disputes are less concerned about the rights and boundaries of patents, and more about **antitrust limits** to market **behavior**: they concern market **abusive practices** and **restrictions** to **competition** as much as they are about intellectual property.

If the SEP system actually **does break** at some point, the consequences would be **felt** throughout the **economy**. SEPs have been a **critical part** of the ICT revolution. SEPs have allowed for the **fast rates** of innovation **diffusion** that the world has witnessed over the **past quarter** of a **century**. All the computer and Internet related products and services that people are now dependent upon for their private and professional lives are **intricate webs** of intellectual property. As many as 250,000 patents can be used to claim ownership of some technical specification or design element in a single smartphone (NYT 2012). A laptop, suggests one calculation, implements more than 250 interoperability standards (Biddle et al. 2010), and the number of SEP holders for 3G and 4G standards grew from 2 in 1994 to 130 in 2013 while the number of SEPs rose from fewer than 150 in 1994 to more than 150,000 in 2013 (Galetovic and Gupta 2016). The standardization-body ETSI has registered more than 150,000 declarations of SEPs from companies, and ETSI is just one of many bodies in the world of ICT standardization. For the 3G standard, the same body has about 24,000 patents that have been declared essential. Now, with the economy yet again on the **threshold** of big technological change, a **trusted** and **credible system** for creators and users of technology to standardize proprietary technology would be a boon for **innovation**, **interoperability** and – ultimately – the **consumers**.

And there are reasons for optimism. Although many of the problems in the SEP regimes need to be addressed, the numbers above indicate that the SEP system is in fact attractive to patent holders and SEP implementers. It is easy to see why: neither holders nor implementers are presented with alternative options that on the face of it would be far more profitable for them. In other words, there simply would not be as many patents declared as essential if both creators and users of technology believed the SEP system worked to their disadvantage or was grossly unfair. While the reality for some companies may be that legal disputes and unpredictability prompt them to find other ways than SEPs to get access to key technologies for their products, it remains the case that most stakeholders have strong economic incentives to maintain a balanced SEP system that is trusted.

First, standard essential patents are an asset for creators of technology because, by becoming **essential** to a standard, their volumes of sales for technologies that users value rise **significantly**. As many holders want to raise more revenues for their SEPs and – ideally – have the freedom to contract with buyers on their terms, they can expand their customer base when they agree to sell patented technology in accordance with a set of rules that are designed to prevent SEP holders exploiting the weakness of a customer that has grown dependent on having access to their technology.

Second, SEPs are hugely **beneficial** also to those that buy the licenses – the implementers or users. Through the SEP system, they can access technologies that are **interoperable** and work with different **products** and **functionalities** – and they can do it under conditions that, if history is a guide, in most cases give them stable and predictable terms of contract. As a consequence, both creators and users can focus on their competitive advantages and profit on the economies of scale and specialization. Downstream firms do not need to develop their own upstream technology and upstream firms do not need to package their technologies in end-customer products in order to make their products valuable.

Third, standard-setting organisations (SSOs) also have a big stake in an SEP system that works well – and, like creators and users of technology, they would stand to lose significantly if the SEP system were to collapse.

Lastly, the biggest beneficiaries are individual consumers – those who buy the end products using FRAND-conditioned SEPs. The advent of SEPs and the rules represented by FRAND have enabled a **development** of fast technology creation and contributed to the **rapid diffusion** in ICT goods and ICT-based services. The SEP system has also allowed for new competition, both between existing technologies and brands, and from new ones that have stepped into the market with the ambition to disrupt it, again to the benefit of the consumer. It is **difficult** to imagine that the ICT and digital **development** would have been as **fast** as it has been if SEPs had not been a **central feature** of the **market**.

The changing fortunes of companies operating in the cellular and smartphone market would not have been possible if there had not been an SEP system that supported competition. Now that the **world economy** is on the **doorstep** of new innovations that are dependent on a great number of input technologies – e.g. the Internet-of-Things, transport connectivity and intelligent vehicles – it is **crucially important** for the consumer that a **balanced** and **functioning** SEP system is maintained and that actors in the system **converge** towards it – which would ultimately **meet** their **economic interests**.

**Emergence of smart cities depends on IoT applications of 5G interoperability standards---absent FRAND, excessive royalties will undermine sustainable development.**

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In December, we [outlined](https://actonline.org/2017/12/18/smart-cities-connecting-your-community-through-technology/%5d) the emergence of **Smart Cities** – cities that harness technological **innovations** like internet of things (**IoT**) devices and data analytics to improve essential infrastructure in growing urban centers. The technological foundation of Smart Cities aims to improve public safety, better allocate resources, and meet the needs of citizens more quickly.

A central element to Smart Cities is the comprehensive network of sensors and devices implemented within buildings, roads, traffic signs, and parking meters that allows them to interact with public, and potentially private-owned, infrastructure. These sensors will “speak” to one another, communicating information about energy usage, traffic density, or other elements of city management that have traditionally either been analyzed separately or not tracked at all. The potential of Smart Cities allows data to flow from previously disconnected branches of the city and be processed in real-time, unlocking previously unknown insights.

The powerful **interoperability** of Smart Cities will rely heavily on **standardized technologies** developed in organizations like the IEEE, which is responsible for standardizing the wi-fi technology we use every day. Standardized technologies often include standard-essential patents (**SEPs**), which, like their name suggests, are patents declared essential to an industry standard by a standards-setting organization. In simple terms, one cannot implement the standardized technology without using the patent.

Like regular patents, the users of SEPs must pay royalties or **licensing fees** to the patent owner before they may use it. For example, if a manufacturing company wants to make an IoT device interoperable with a 5G network, the manufacturer must pay a licensing fee to the owner of the SEP that is essential to the 5G standard. SEPs play a **vital role** in the new innovations we enjoy and have come to expect, and because of the value of these patents, SEP holders have the ability to demand **high license fees** from those who wish to implement the standard. To offset this **competition issue**, many SEP holders **voluntarily** agree to license their SEPs to any willing licensee under fair, reasonable, and non-discriminatory (**FRAND**) terms.

While wi-fi and LTE are standards that will be vital to Smart City deployment, countless new standardized technologies are being developed that will be integral to any fully-operational Smart City. With **reasonable access** to SEPs, assured by the FRAND commitment, innovators can enjoy the **legal** and **business certainty** they need to **compete**. While the meaning of the FRAND commitment continues to be refined – as evidenced by the development of SEP best practices recently launched by the App Association in Europe – its foundations are well-established.

But what happens when SEP holders do not abide by the FRAND licensing commitment, or simply refuse to license at all? Sadly, small and medium-sized companies would be **forced** to accept **untenable** licensing terms, but more realistically, they would be **priced out** of using the standard **altogether**. As a result, it would impose a **barrier** to **innovation** that would result in **fewer products** offered to consumers or cities eager to implement **IoT technologies**. For example, many hope the rise of autonomous vehicles will be seamlessly integrated into the Smart City network. But how beneficial would it be if only some autonomous vehicle brands are able to license the technology needed to communicate with traffic lights, simply because of the market power of a chipmaker? The FRAND commitment is an important backstop to that unfortunate possibility.

It is vital for SEP holders to honor FRAND licensing terms, if not for small and medium-sized innovators, then for the sustainability of future Smart Cities. FRAND creates a platform for innovation, providing a floor on which companies can stand, innovate, and compete. If the foundation of the FRAND commitment is reneged, American innovators pay a **steep price** – not only do they lose a **key component** of product **development** and **market entry**, but they are also left with years of expensive negotiations and litigation if they choose to challenge the licensing practice. What’s more, the **confidence** developed in the open standards development system is **shaken**, and Smart Cities have fewer choices in IoT solutions for their future.

To achieve the promise of Smart Cities, a balanced standards ecosystem is essential. We must allow small and medium-sized developers to **leverage industry standards** for innovation and prevent cost-prohibitive royalty structures and negotiating practices that are **detrimental** to **competition**, while also ensuring that SEP owners can protect their intellectual property and be fairly compensated for its use. The FRAND commitment continues to be the **best framework** to achieve this balance, and **adherence** to its **principles** will determine the **future** and **success** of **Smart Cities**.

**Climate change is anthropogenic---5G-enabled smart cities are critical for mitigation and adaptation.**

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Currently, the **entire planet** is at risk due to continual **climate change** [1–3]. The recorded increase in average temperature across the world in the past hundred years, and the associated changes attributed to this, are known as global warming. Many scientists are convinced by the published evidence that this change is **anthropogenic** and resulted from the **elevated emission levels** of global greenhouse gases (GHGs) [4,5]. Gases such as water vapor, carbon dioxide, methane, nitrous oxide, and ozone are responsible for the absorption and emission of thermal radiation. These changes in the relative quantities of the GHGs induce a proportional change in the amount of preserved solar energy. Presently, the accepted indicator for global warming is the sustained rise in the mean temperature worldwide. This definition is designed to account for the fact that there may be some localized exceptions to this rise. For example, there may be cooling experienced in a region while the global temperature may increase altogether, hence the need for average temperature. A key concern with the GHGs trapping of more heat in the atmosphere is that it affects both climate and short scale weather patterns. Consequently, it results in **greater numbers** of **adverse weather events** such as storms, heat waves, cold snaps, droughts, and fires [6]. **Climate-related risks** to health, livelihoods, food security, water supply, human safety, and economic growth are projected to **increase** with global warming of 1.5 ◦C [7] and further increase further at 2 ◦C, as shown in Figure 1. In addition, the risks to global aggregated economic growth due to the climate change impacts are projected to be lower at 1.5 ◦C than at 2 ◦C by the end of this century.

Carbon dioxide has the most **substantial effect** on global warming [8]. Although it was once assumed to have an ~100 year lifespan in the atmosphere, careful studies revealed that the situation is far worse, with three-quarters of the gas expected to remain for a time in the region of up to ~1000 years, with the remainder lasting for an indefinite period of time [9]. It was indicated that the present impacts of humanity on the atmosphere can certainly cause a long term problem [10]. Carbon dioxide is released when oil, coal, and other fossil fuels are burnt for the energy we use to power our homes, cars, and smartphones. By **lessening** its **usage**, we can **curb** our own **contribution** to climate change while saving money. The first challenge is eliminating the burning of coal, oil, and, eventually, natural gas. Oil is the lubricant of the global economy as it is hidden inside such ubiquitous items as plastic and corn, fundamental to the transportation of both consumers and goods. Coal is the substrate, supplying roughly half of the electricity worldwide, a percentage that is likely to grow according to the International Energy Agency (IEA). In fact, buildings contribute up to 43% of all the greenhouse gas emissions worldwide [11], even though investing in thicker insulation and other cost-effective as well as temperature-regulating strategies can save money in the long run. Investment in **new infrastructures**, or radical **upgradation** of the existing highways and transmission lines, may help to **reduce** greenhouse gas **emissions**, yielding economic growth in the developing countries.

Nations across the globe have kept very **high targets** to reducing their GHG discharges [12,13]. In order to meet these goals, **considerable reductions** in city energy usage is required. At a global scale, urban communities represent over half (55%) of the population, which is predicted to reach **68%** by the middle of this century [14]. Urban areas claim ownership of the **highest levels** of energy use, gas emission, and also the largest local economy. As such, it is **crucial** for urban areas to **reduce** their **consumption** and utilize **renewable sources** wherever available to reduce their gas discharge levels. Smart cities often utilize **digital sensors** to measure and transmit data about the levels of GHGs in the city at that moment, as a means of tackling them [15]. The **efficacy** of such a system is thus **reliant** on the network used to collate and analyze the data collected as an extant network. The mobile telecommunications networks offer a **convenient solution** to this desire, as their pre-existence has the clear benefit of reducing costs compared to the design and implementation of a novel system. It is recognized that smart cities will certainly act as the key players meeting these ambitious targets [16,17]. In this study, we focused primarily on the potential applications of 5G network technology to control climate change in Singapore. In addition, a **clear overview** of the **sustainability benefits** of introducing **5G** technology **compatible** smart cities, buildings, and farms in all aspects of urbanization is provided. Herein, the main purpose is to tackle the **negative outcomes** associated with **anthropogenic climate change**, with a particular focus on the contributions that are best made by the telecoms network operators.

Climate change is one of the most **challenging problems** that humanity has ever faced. Presently, hundreds of millions of lives, innumerable species, entire ecosystems, health, economy, and the future habitability of this planet are at risk. Fortunately, climate change is **solvable**, we just need to **wisely exploit** the **existing technologies** and **sciences**. Climate change mitigation is a pressing international need in which many management actions are required. The development of 5G technology has been largely driven by smart mobile devices and advanced communication technologies. It may thus serve as a **technical enabler** for a whole new range of business opportunities, energy, and facilities management, together with industrial applications. Moreover, it may enable different devices to work together seamlessly. Definitely, the 5G cellular network technology is expected to **revolutionize** the **global industries** with **profound effects** on the savings of energy, waste generation and recycling, and water resources management, thus **reducing** the **climate change impacts**.

#### That devastates plants

St. George 21, reporter based in Baltimore. (Zach, June 17, 2021, As Climate Warms, a Rearrangement of World’s Plant Life Looms, https://e360.yale.edu/features/as-climate-warms-a-rearrangement-of-worlds-plant-life-looms)

As human-generated greenhouse gas emissions cause the world to rapidly warm, this movement is once again under way. Scientists have observed plants shifting toward the poles and upslope. They’ve noted old ecosystems suddenly replaced by new ones, often in the wake of fire, insect outbreaks, drought or other disturbances. They’ve observed an increase in the number of trees dying and watched as a growing number of the world’s biggest and oldest plants, including the baobabs of Africa and the cedars of Lebanon, have succumbed. Just this month, scientists announced that the Castle Fire, which burned through California’s Sierra Nevada last year, singlehandedly killed off more than 10 percent of the world’s mature giant sequoias.

#### AND animals

CNWF 21, (Climate Change, <https://www.nwf.org/educational-resources/wildlife-guide/threats-to-wildlife/climate-change>)

Climate change is quickly becoming the biggest threat to the long-term survival of America’s wildlife. No longer is climate change something only facing future generations—changes to our climate are being documented all across the planet today, and people, animals, and plants are already feeling the heat. This warming signal is also found in ocean temperatures, soil temperatures, melting glaciers, and melting polar ice caps. It has been linked to widespread impacts on ecosystems around the planet. This preponderance of evidence all points to the conclusion that our planet is warming, and natural systems are struggling to keep up.

#### Plants and animals have become climate refugees — that makes solving climate change an a priori issue for all

Yulsman 20, Environmental reporter for Discover, (Tom, 2/13/20, A Different Kind of Climate Refugee, https://www.discovermagazine.com/environment/a-different-kind-of-climate-refugee)

Thanks to human-caused climate change, countless plants and animals will also need to move in order to survive. But as disruptive as climate migration will be for humans, many of our fellow inhabitants of Earth will not have the options that will be open to us. That could be particularly true for plant species adapted to living in the Arctic — a region warming twice as fast as any other on Earth. At a certain point, they will not be able to move any farther north to find places safe from competition by shrubs and trees well adapted to warmer temperatures. That's because they'll simply run out of land before hitting the Arctic Ocean and surrounding waters. For plants adapted to living in the particularly harsh climate of mountainous areas in the Arctic, the prospect of a warming environment is particularly daunting: They can try migrating up mountainsides, but they will eventually reach the top and have nowhere else to go. "There is not so much space if you move too far up and go too far north," says Inger Greve Alsos, a scientist with The Arctic University Museum of Norway. "So will they survive this warming?" To preserve the diversity of these plant species facing the threat of human-caused warming, what helpful measures could we take? These questions are at the heart of her research, which Alsos described at the recent Arctic Frontiers conference in Tromsø, Norway. You might be wondering why anyone should care about plants that live in an environment so far removed from most of us. I wondered that too — so I asked Alsos about it. The threat is not unique to arctic-alpine plants, she noted. High altitude plants around the world are facing it too.

**1AC — Cybersecurity**

**Advantage 2 is Cybersecurity —**

**Aggressive patent strategies create structural flaws in 5G standardization that imperils domestic cybersecurity---market competition reduces the incidence of vulnerability and severity of attacks.**

**Duan 20**, \*Charles Duan is a senior fellow and associate director of tech & innovation policy at the R Street Institute, where he focuses his research on intellectual property issues; (2020, “OF MONOPOLIES AND MONOCULTURES: THE INTERSECTION OF PATENTS AND NATIONAL SECURITY”, Santa Clara High Technology Law Journal, 36(4), 369-405. Retrieved from <https://www2.lib.ku.edu/login?url=https://www.proquest.com/scholarly-journals/monopolies-monocultures-intersection-patents/docview/2442966690/se-2?accountid=14556>)

III. COMPETITION AND CYBERSECURITY

In addition to the historical review done so far, another approach to understanding the relationship among patents, competition, and national security is to consider the role of **cybersecurity**. There is little doubt that computer system vulnerabilities that enable **hacking** and **spread** of **computer exploits** are a **threat** to the **nation’s defenses**, so better cybersecurity is a **key part** of national security strategy.155

**Strong competition** can thus **complement** national security by enhancing domestic cybersecurity, and **patent assertion** that **unduly weakens** competition **detracts** from cybersecurity.156 Competition promotes better cybersecurity in at least two ways. First, multiple studies show that competition encourages firms to improve their products on multiple vectors including cybersecurity. Second, competition avoids a situation that security experts call a “monoculture,” which increases vulnerability to severe cyberattacks. As former Secretary of Homeland Security Michael Chertoff wrote recently, “We need **competition** and **multiple providers**, not a potentially vulnerable technological monoculture,” to **guarantee** national security.157 Thus, cybersecurity provides a **useful lens** for understanding how **unfettered** patent assertion and **licensing** can **detract** from **national security**.

A. Cybersecurity as Competitive Value-Add

Competition enhances national security by **reducing** the **incidence** of technical **vulnerabilities**. That effect is **especially important** for security **sensitive systems** such as **mobile telecommunications**.

Intuitively, a **causal chain** from **competition** to **cybersecurity** makes logical sense. Computer security is a value-added benefit to consumers, so firms in competitive markets are likely to use security to gain an edge over their competitors.158 In monopolized markets, though, there may be less **external impetus** to **test products** for flaws, and the **monopolist** may **choose** to **focus less** on **security** and more on new product features or increased product quality.

Economic research confirms these hypotheses about competition leading to better cybersecurity. A 2009 empirical study of web browsers considered the impact of market concentration on the amount of time that vendors took to fix security vulnerabilities as they were discovered.159 The study found that the **presence** of more **competitors** correlated with **faster cybersecurity** response—a reduction of 8–10 days in response time per additional market rival.160 Similarly, business researchers in 2005 modeled incentives for firms to engage in sharing of cybersecurity information, and concluded that the “**inclination** to **share information** and **invest** in **security technologies** increases as the **degree** of **competitiveness** in an industry increases.”161 Another study found that, where two software firms are in competition, at least one will be willing to take on **some degree** of **risk** and **responsibility** for cybersecurity, whereas a monopoly software firm will **consistently fail** to accept such responsibility.162 To be sure, an unpublished study from 2017 found that some market concentration can make firms more responsive to cybersecurity issues, but only to a point: “being in a dominant position reduces the positive effect of having less competitors on the responsiveness of the vendor,” and indeed the “more dominant the firm is, the less rapid it is in releasing security patches.”163 This research confirms that competition is more conducive to cybersecurity.

It is not hard to see how this applies to emerging communication technologies markets. In the absence of competition, the above research suggests that device manufacturers, chip makers, and software developers will **lack incentives** to **respond** to **vulnerabilities**, to **share information** about cybersecurity practices and issues, and to **take responsibility** for security matters. Mobile phone chips have had their share of cybersecurity failures already.164 **The best way to flush out ongoing and future cybersecurity issues is to maintain competitive pressure at all levels of the supply chain.**

B. Vulnerabilities of “Monocultures”

A second reason why monopoly undermines cybersecurity is that monopoly leads to a “**monoculture**” of single-vendor products, opening the door to **massive** systemic **failure** in the case of a **cyberattack**. Computer researchers developed the theory of software monocultures in the early 2000s, in response to the regular phenomenon of computer viruses and other attacks spreading rapidly by exploiting flaws in the dominant operating system at the time, Microsoft Windows.165 Where a computer system such as Windows has a commanding share of users, a virus that **exploits** a **flaw** in that system can quickly **spread** to **infect** a whole **interconnected ecosystem**. An operating system monopoly thus enables fast and easy spread of cyberattacks, and better cybersecurity would be achieved through greater diversity in online systems.166 As one research group posited, “a network architecture that **supports** a collection of **heterogeneous network** elements for the same **functional capability** offers a **greater possibility** of **surviving** security **attacks** as compared to **homogeneous networks**.”167

There has been considerable study of the theory that computer monocultures are **naturally** more **vulnerable** to attacks.168 In one study, computer science researchers reviewed a catalog of 6,340 software vulnerabilities recorded in 2007, to compare whether comparable software would share the same flaws.169 Of the 2,627 vulnerabilities applicable to application software (as opposed to operating systems, web scripts, and other software components), only 29 (1.1%) applied to substitute products from different vendors but providing the same functionality.170 By contrast, different versions of a single software product were found to share vulnerabilities 84.7% of the time.171 Thus, software monocultures share **exploitable flaws** even when there is some **variation** in **versions** across the **monoculture**; by contrast, diversity in software is almost **guaranteed** to **prevent** a **single flaw** from **affecting** all **users**.

In the case of 5G and wireless mobile communications, a monoculture is an **especially concerning** possibility. To the extent that systems such as smart city sensors or communication networks are **widely deployed** in a monoculture fashion, a **widespread attack** could have **devastating** consequences, potentially blacking out a region and affecting essential services such as 911.172 A monoculture that is vulnerable to so-called “**rootkits**” or “**backdoors**”—maliciously installed software that enable **bad actors** to commandeer systems—could also enable **mass surveillance** or **spying** by private hackers or foreign governments.173 The presence of systems from **multiple vendors** would mitigate these possibilities.

The monoculture theory is not without critics, but a review of those criticisms shows them to be inapplicable to contemporary communication technologies. Some critics suggest that software diversity imposes **unwarranted costs** on firms who must **forego** economies of scale and devise seemingly duplicative yet different setups of computer systems.174 But those concerns **largely focus** on the situation where a **single firm** produces and manages heterogeneous systems, concerns that are **avoided** where **heterogeneity** arises **naturally** through **competition** between two **unrelated** firms. Critics also argue that technological measures can create “artificial diversity” through automated randomization of software code, so software engineers can purportedly solve monoculture issues and device users need not worry about the issue.175 But even these critics acknowledge that artificial diversity techniques are often **insufficient** because they must make **assumptions** about what **aspects** of the **technology** are **most vulnerable** to **attack**, and they **concede** that artificial diversity **cannot stop** attacks involving operation of **legitimate** software functions in **undesirable** ways (sending spam emails or deleting document files, for example).176

It is widely recognized that a monoculture is **unavoidable** in at least one respect: Most connected devices will need to **conform** to technical **standards**.177 5G, for example, is a technical standard developed by a private industry consortium called 3GPP.178 A **flaw** in any such standard would render **all mobile devices** implementing the standard **vulnerable** to an **identical attack**.179 Avoiding these sorts of **systemic flaws** in standards requires rigorous **development**, **analysis**, and **testing** of the standard in the development process, which in turn requires ensuring that **as many firms** as **possible**, especially firms that share basic American values, are **involved** in the **development** of those **standards**.180 Thus, the necessary **standardization** of **information** and **communication technologies** is perhaps the most **important reason** why a **competitive** communication technology **market** is **essential** to **cybersecurity** and national security.

**Insecure technical standards cause inevitable systemic grid collapse — that’s necessary for basic societal functioning** — food, health care, etc.

**DeNardis 21**, \*Dr. Laura DeNardis, PhD in Science and Technology Studies from Virginia Tech, Dean of the School of Communication at American University, and Gordon M. Goldstein, Adjunct Senior Fellow at the Council on Foreign Relations, (March 1st, 2021, “The Real Lesson of the Texas Power Debacle”, Lawfare, 3/1/2021, https://www.lawfareblog.com/real-lesson-texas-power-debacle)

The infrastructure was essential, ubiquitous and providing basic functionality for everything in daily life from water to heat and transportation. And in an instant it was gone, plunging tens of thousands of residents into a life-threatening crisis. This is, of course, the narrative of the recent debacle in Texas, where a winter storm overwhelmed the state’s electrical grid and brought the state to a near-total blackout. But it should also be interpreted as a preemptive **warning** of what Americans will face from the next generation of the **internet** and the new realm of cybersecurity risk it will **dramatically** amplify.

Both forms of infrastructure—a state-run electrical grid and the **5G** and “**internet of things**” future to which we are rapidly hurtling—share three attributes. First, their construction reflects a lack of imagination about the danger that can quickly **coalesce** when seemingly remote threat scenarios become real. Second, compounding a lack of analytic imagination is an absence of preparedness. Third, for both the Texas electrical grid and the emerging internet, public policy protections are either meager or completely absent.

In planning for the resilience of its electrical grid, public officials in Texas **discounted** the potentially devastating disruption that could occur from **unpredictable** events—whether related to climate change or just a once-a-century anomaly. They also eschewed precautions other states take seriously by allowing for the interconnection of electrical grid supply chains across their borders, ostensibly because of their ideological rejection of federal regulatory oversight governing such arrangements.

As the United States builds out a new national **5G** cyber-physical communications network through private service providers, Americans similarly **discount** the **risks**—myriad in their diversity and severity—that are **orders** of **magnitude** more **significant** than what Texas confronted recently. More physical things than people are already connected. The super empowered internet of tomorrow, known among some in the field as the “internet of everything,” will exceed by **tens of billions** of devices the number of connections between individuals simply communicating via social media or digital screens.

This confronts policymakers with an imminent threat: A cyber outage is **no longer** about losing digital communications but about losing basic **societal functioning** and even **human life**. The failure of imagination is to think of the SolarWinds attack on U.S. federal agencies and tech companies as a **worst-case scenario**. The failure of imagination is to think of cybersecurity through a content-centric lens rather than as possible attacks on the material world. The emergence of internet-connected cardiac devices, digitally dependent cars, and internet-connected agriculture systems portend the stakes of a cyberattack to **health care**, economic and **social functioning**, and **food security.**

The United States should be prepared for, and certainly not be caught by surprise by, such cyberattacks. Yet, the internet of everything is notoriously **insecure**. Internet-connected physical objects are not necessarily upgradeable. Nor do they come with adequate default security and encryption. The 5G infrastructure that helps connect digital objects has been at the center of debates over Chinese espionage. Industrial cyber-physical **systems** are based on **technical standards** that have not been collaboratively vetted for **security** and **interoperability**. One of the most infamous cyberattacks—the so-called Mirai botnet that took down major media sites and corporations—hijacked these insecure objects in homes to carry out the assault. The United States is not yet prepared.

Finally, in the race to conceive and deploy effective public policy responses, the U.S. government as a whole is hardly more anticipatory or synthesized in its response to potential calamity than the state of Texas. The focus of U.S. cyber policy remains on information policy issues such as disinformation, manipulation and violent speech rather than securing the digital world that now powers our material day-to-day lives. The Biden administration confronts an enormous challenge in crafting a comprehensive strategy to the cybersecurity risks foreshadowed by the ruinous experience in Texas and its management of vital infrastructure. While the digital world has leapt from two-dimensional to three-dimensional space, cyber policy has not at all jumped from 2D to 3D.

This failure of imagination, preparedness and policy protection must not be America’s cyber future; the stakes are far **too high** and the costs are far **too great.** The Texas disaster is a potent illustration of what has always been true: Our digital society and economy are extremely vulnerable and grow more porous and subject to penetration day by day. As digital sensors and cyber control systems become further embedded in physical infrastructure like energy systems, agriculture and transportation, there is no longer a separation between security of the **“real” world** and security of the **online world**. They are **entangled** and increasingly **enmeshed**—and policy has yet to catch up to either envisioning or mitigating the looming threats the U.S. confronts.

#### Cyberwar is increasingly likely---SolarWind emboldens hackers to undermine critical infrastructure and nuclear supply chains.

Bajema 21, \*Dr. Natasha Bajema is the Director of the [Converging Risks Lab at the Council on Strategic Risks](https://councilonstrategicrisks.org/programs/csw/dr-natasha-bajema/) and an IEEE Spectrum contributor. She has held long-term assignments at the National Defense University, in the U.S. Office of the Secretary of Defense, and at the U.S. Department of Energy’s National Nuclear Security Administration; (March 24th, 2021, “Today's Cyberattacks Foreshadow Wars to Come”, https://spectrum.ieee.org/riskfactor/aerospace/military/todays-cyberattacks-foreshadow-wars-to-come)

Cyberattacks are no longer just a matter of cybersecurity, they directly threaten a country’s national security. Cyberattacks alter the character of warfare—much like nuclear weapons once did, allowing adversaries to potentially cross enemy lines to harm large numbers of innocent civilians.

Today’s malicious actors can now seek to cause physical damage from remote locations through digital channels, wreaking devastation on a country at levels that previously would have required a kinetic attack.

On February 8, 2021, hackers breached the Bruce T. Haddock Water Treatment Plant in Oldsmar, Fla. using known software vulnerabilities in an attempt to poison the local water supply with sodium hydroxide—also known as lye. They accessed the plant through its industrial control system (ICS)—a system designed to allow for remote control and supervision of the plant. Taking over the plant’s controls, hackers increased parts of the chemical, used to [adjust the acidity and remove metals from drinking water](https://www.foxnews.com/politics/senate-intel-chairman-florida-water-plant-cyberattack), to one hundred times over the normal level. The system used an [old version of Windows, was accessible with a shared password, and had no firewall protection against intrusions](https://techgenix.com/florida-water-treatment-facility-cyberattack/). Thankfully, [a supervisor noticed the dangerous change in time whilst working remotely](https://www.govtech.com/em/safety/Cyberattack-on-Water-Treatment-Facility-Suggests-More-to-Come.html), averting a crisis that may have caused chemical burns and blindness among those exposed to the toxic chemical.

U.S. government officials have recently expressed concerns about similar vulnerabilities across water and energy sectors and other critical infrastructure including [health, emergency services, food and agriculture, and transportation systems](https://www.foxnews.com/politics/senate-intel-chairman-florida-water-plant-cyberattack). The cyberattack on the water plant occurred just a week before a major winter storm led to a widespread blackout and water crisis across Texas. [More than five million](https://time.com/5939633/texas-power-outage-blackouts/) went without power and running water for several days, illustrating the fragility of such interconnected infrastructure and the physical devastation that could be caused in the event of a cyberattack targeting the grid.

Critical infrastructure is not alone in its vulnerabilities to cyberattacks with physical implications—supply chains are also at risk. For at least a span of months (if not years), hackers have [exploited vulnerabilities](https://en.wikipedia.org/wiki/2020_United_States_federal_government_data_breach) in software from Microsoft, VMWare and the Texas-based company [SolarWinds](https://www.solarwinds.com/) to compromise data security in at least 200 organizations in the U.S. government and other agencies around the world.

Although the SolarWinds attack appears to be a [case of classic espionage by Russia](https://www.securityinfowatch.com/cybersecurity/article/21206223/more-questions-than-answers-as-solarwinds-breach-probe-expands) via the U.S. supply chain, there are aspects of the attack that also illustrate the potential for achieving physical effects via digital channels. As early as [March 2020](https://www.securityinfowatch.com/cybersecurity/article/21206223/more-questions-than-answers-as-solarwinds-breach-probe-expands), Russian hackers breached the Orion network management software designed by SolarWinds, a federal contractor, and planted malicious code likely intended to gain access to sensitive information. Evidence of malware was first detected [in December by a cybersecurity company](https://www.newsweek.com/colorado-representative-says-solarwinds-hack-could-cyber-equivalent-pearl-harbor-1555994) that also uses the Orion software. The impact of the SolarWinds cyberattack spanned [thousands of networks](https://www.securityinfowatch.com/cybersecurity/article/21206223/more-questions-than-answers-as-solarwinds-breach-probe-expands) at [nine federal agencies and 100 private sector companies](https://www.cyberscoop.com/solarwinds-cyber-espionage-russia-neuberger/), including the Department of Energy’s National Nuclear Security Administration (NNSA), which is responsible for overseeing the U.S. nuclear weapons stockpile.

Although NNSA claims there was no impact to classified systems, officials found [evidence of attempted intrusion](http://www.politico.com/news/2020/12/22/nuclear-weapons-agency-congress-hacking-450184) in unclassified systems—although, according to the NNSA Public Affairs office, the system in question was used for business purposes, not for transport of nuclear weapons and materials. The agency also detected attempts to gain access to servers at the Los Alamos National Laboratory—one of three nuclear weapons labs. [NNSA immediately disconnected the software from relevant networks](https://www.energy.gov/articles/doe-update-cyber-incident-related-solar-winds-compromise), removing the possibility for deleterious effects. While hackers were not likely targeting the transport of nuclear weapons, the [vulnerabilities of nuclear weapons](https://www.nap.edu/read/11538/chapter/6#112) [while en-route](https://www.osti.gov/servlets/purl/1409912) [between secure locations](https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1348_web.pdf) are well known.

The exact objectives for the SolarWinds cyberattack remain unclear, but the vast extent of its reach may demonstrate to U.S. adversaries the significant potential of cyberattacks for achieving physical ends, including the possibility of stealing nuclear weapons. However, the incident is not the first major one from which malicious actors have deduced such capabilities—[consider the lessons from the NotPetya attack in 2017](https://spectrum.ieee.org/tech-talk/computing/it/notpetya-latest-ransomware-is-a-warning-note-from-the-future). Russian hackers spread malicious code through a popular accounting software developed by a Ukrainian business across many countries in Europe, eventually infecting tens of thousands of computers around the world. In addition to rendering infected computers useless, the attack shut down the global operations of the Maersk shipping company and caused major traffic congestion on the roads near ports in the United States. It also slowed operations of Merck & Co, Inc., a major producer of drugs and vaccines in the U.S., [reducing production capacity for a short period of time](https://www.fiercepharma.com/manufacturing/merck-has-hardened-its-defenses-against-cyber-attacks-like-one-last-year-cost-it). Even a classic espionage or sabotage incident may carry significant potential for physical damage.

The [Biden administration has already issued guidance](https://www.whitehouse.gov/briefing-room/presidential-actions/2021/02/24/executive-order-on-americas-supply-chains/) for shoring up vulnerabilities in U.S. supply chains, but much more needs to be done to protect critical infrastructure and dissuade malicious actors from exploiting digital channels to achieve physical ends. In an era of hybrid and gray zone warfare, cyberattacks are attractive to nations seeking to undermine their adversaries due to challenges of attribution and the associated benefit of deniability. In the future, these nations may also come to see cyberattacks with physical effects as a new form of warfare—a Trojan horse in the form of their adversary’s own infrastructure or supply chains. In so doing, they can cross enemy lines and cause damage and destruction without defeating any military forces.

**Actors have the means and motivations to strike critical infrastructure.**

**Wintch 21**, \*Timothy M. Wintch, an active-duty Major in the United States Air Force. He is currently a graduate student at the Oettinger School of Science & Technology Intelligence, National Intelligence University, in Bethesda, Maryland. Mr. Wintch has over 11 years of experience in command-and-control operations as an Air Battle Manager. He holds a Bachelor of Arts in Politics from the University of California, Santa Cruz, and a Master of Arts in Military Studies from American Military University. (April 20th, 2021, “PERSPECTIVE: Cyber and Physical Threats to the U.S. Power Grid and Keeping the Lights on”, https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/)

Among critical infrastructure sectors in the U.S., energy is perhaps the most crucial of the 16 sectors defined by the Department of Homeland Security. This sector is **so vital** because it provides the energy necessary to run **every other** critical infrastructure sector. However, the U.S. power grid, the backbone of the energy sector, is built upon an aging skeleton that is becoming increasingly **vulnerable** every day. Whether from terrorists or nation-states like Russia and China, the power grid is susceptible to not just physical attacks, but also to **cyber** intrusion as well. However, much of this threat can be mitigated if the U.S. takes the appropriate steps to safeguard the power grid and avoid a potential catastrophe in the future.

Since Sept. 11, 2001, terrorism on U.S. soil has been at the forefront of American consciousness. Critical infrastructure provides an **appealing** target because of the disproportionally **large impact** even a **small attack** can have on the sectors. In particular, the power grid represents a particularly lucrative target, both in terms of the ease of access and the large impact it can make. The National Research Council stated that the U.S. power grid is “vulnerable to intelligent multi-site attacks by knowledgeable attackers intent on causing maximum physical damage to key components on a wide geographical scale.”[[1]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn1) Additionally, the physical security of transmission and distribution systems is difficult due to the **dispersed** nature of these key components, which in turn is advantageous to attackers as it reduces the likelihood of their capture.[[2]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn2) From 2002-2012, approximately 2,500 physical attacks occurred against transmission lines and towers worldwide and approximately 500 attacks against transformer substations.[[3]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn3) Terrorists have the **motivation** to attack the U.S. power grid but the very nature of the grid makes it highly vulnerable. The power grid is not only at risk from physical attacks, but also nation-state cyberattacks.

One nation that has shown both the **capability** and **intent** to use attacks against critical energy infrastructure is Russia, as demonstrated in their 2015 annexation of Crimea from Ukraine. A Russian cyber threat group known as Sandworm, which used its BlackEnergy malware, attacked Ukrainian computer systems that provide remote control of the Ukraine power grid.[[4]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn4) This attack, and another in 2016, each left the capital Kiev without power, prompting cyber experts to raise concern about the same malware already existing in NATO and the U.S. power grids.[[5]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn5) In any conflict between Russia and NATO, not only would similar cyberattacks pose a threat, but so would potential physical attacks severing fuel oil and natural gas lines to Western Europe. Russia has both the capability and intent to attack critical infrastructure, particularly power grids, during future conflicts in their “hybrid warfare” approach.

Another nation that has the capability to attack critical energy infrastructure is China, representing a threat to not just the U.S. energy infrastructure but also that of our allies whose support would be vital in a major conflict. A recent NATO report highlighted this threat from China’s Belt and Road Initiative, stating that “[China’s] foreign direct investment in strategic sectors [such as energy generation and distribution] …raises questions about whether access and control over such infrastructure can be maintained, particularly in crisis when it would be required to support the military.”[[6]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn6) Like Russia, China has been **active** with cyber **intrusions** in U.S. energy **infrastructure**. The Mission Support Center at Idaho National Laboratory characterized these as attacks as “multiple intrusions into US ICS/SCADA [Industrial Control Systems/Supervisory Control and Data Acquisition] and smart grid tools [that] may be aimed more at intellectual property theft and gathering intelligence to bolster their own infrastructure, but it is likely that they are also using these intrusions to develop capabilities to attack the [**bulk** electric system], as well.”[[7]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn7) China, therefore, has both the **capability** and **intent** to conduct cyber intrusions and attacks for myriad reasons.

Another arm of this threat is the reliance the U.S. energy industry has on imports from China, especially transformers. In early 2020, federal officials seized a transformer in the port of Houston that had been imported by the Jiangsu Huapeng Transformer Company before sending it to Sandia National Laboratory in Albuquerque. Sandia is contracted by the U.S. Department of Energy for mitigating national security threats.[[8]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn8) The Wall Street Journal reported that “Mike Howard, chief executive of the Electric Power Research Institute, a utility-funded technical organization, said that the diversion of a huge, expensive transformer is so unusual – in his experience, unprecedented – that it suggests officials had significant security concerns.”[[9]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn9) Previously destined for the Washington Area Power Administration’s Ault, Colo., substation, the transformer is believed to have been seized due to “backdoor” exploitable hardware emplaced by the Chinese prior to shipment.[[10]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/#_ftn10) Shortly after these events, President Trump issued Executive Order 13920, “[Securing the United States Bulk-Power System](https://trumpwhitehouse.archives.gov/presidential-actions/executive-order-securing-united-states-bulk-power-system/),” essentially limiting the import of Chinese-built critical energy infrastructure components due to concerns about cybersecurity.[[11]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/#_ftn11) Interestingly, Jiangsu Huapeng “boasted that it supported 10 percent of New York City’s electricity load.”[[12]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/#_ftn12)

Franklin Kramer, the former Assistant Secretary of Defense for International Security Affairs, testified before a U.S. House of Representatives Energy and Commerce subcommittee during an energy and power hearing in 2011 and said that a “highly-coordinated and structured cyber, physical, or blended attack on the **bulk power** system, however, could result in long-term (**irreparable**) damage to key system components in multiple simultaneous or near-**simultaneous strikes**.” He added that “an outage could result with the potential to affect a wide geographic area and cause large population centers to lose power for **extended** periods.”[[13]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/#_ftn13) Even the inclusion of features such as smart grids to the overall grid structure poses new **vulnerabilities** through their connectivity. Kramer stated that “such connectivity means that the **distribution** system could be a **key vector** for a national security attack on the grid.”[[14]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/#_ftn14)

**Those attacks cause accidental nuclear escalation.**

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Yet another pathway to escalation could arise from a cascading series of **cyberstrikes** and **counterstrikes** against **vital national infrastructure** rather than on military targets. All major powers, along with Iran and North Korea, have developed and deployed cyberweapons designed to disrupt and destroy major elements of an adversary’s key **economic systems**, such as **power grids**, **financial systems**, and **transportation networks**. As noted, Russia has **infiltrated** the U.S. **electrical grid**, and it is widely believed that the United States has done the same in Russia.[12](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote12) The Pentagon has also devised a plan known as “Nitro Zeus,” intended to immobilize the entire Iranian economy and so force it to capitulate to U.S. demands or, if that approach failed, to pave the way for a crippling air and missile attack.[13](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote12)

The danger here is that **economic attacks** of this sort, if undertaken during a period of tension and crisis, could lead to an **escalating series** of **tit-for-tat attacks** against ever more **vital elements** of an adversary’s critical infrastructure, producing **widespread chaos** and **harm** and eventually leading one side to initiate **kinetic attacks** on **critical** military **targets**, risking the **slippery slope** to **nuclear conflict**. For example, a Russian cyberattack on the U.S. power grid could trigger U.S. attacks on Russian energy and financial systems, causing widespread disorder in both countries and generating an impulse for even more devastating attacks. At some point, such attacks “could lead to major conflict and possibly nuclear war.”[14](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote14)

These are by no means the only pathways to escalation resulting from the offensive use of cyberweapons. Others include efforts by **third parties**, such as **proxy states** or **terrorist organizations**, to provoke a global nuclear crisis by causing **early-warning systems** to generate **false readings** (“spoofing”) of missile launches. Yet, they do provide a **clear indication** of the **severity** of the **threat**. As states’ reliance on cyberspace grows and cyberweapons become more powerful, the **dangers** of **unintended** or **accidental escalation** can only grow more **severe**.

**Cyber-compromised NC3 causes nuclear war.**

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The Nuclear-Cyber Connection

These links exist because the NC3 systems of the United States and other nuclear-armed states are **heavily dependent** on **computers** and other **digital processors** for virtually **every aspect** of their **operation** and because those systems are **highly vulnerable** to cyberattack. Every nuclear force is composed, most basically, of weapons, early-warning radars, launch facilities, and the top officials, usually presidents or prime ministers, empowered to initiate a nuclear exchange. Connecting them all, however, is an extended network of **communications** and **data-processing** systems, all reliant on **cyberspace**. Warning systems, ground- and space-based, must constantly watch for and analyze possible enemy missile launches. Data on actual threats must rapidly be **communicated** to decision-makers, who must then weigh possible responses and **communicate** chosen outcomes to launch facilities, which in turn must provide attack vectors to delivery systems. All of this involves **operations** in **cyberspace**, and it is in this domain that great power rivals seek **vulnerabilities** to exploit in a constant struggle for advantage.

The use of cyberspace to gain an advantage over adversaries takes many forms and is not always aimed at nuclear systems. China has been accused of engaging in widespread **cyberespionage** to steal technical secrets from U.S. firms for economic and military advantages. Russia has been accused, most extensively in the Robert Mueller report, of exploiting cyberspace to **interfere** in the 2016 U.S. presidential election. Nonstate actors, including terrorist groups such as al Qaeda and the Islamic State group, have used the internet for **recruiting** combatants and spreading fear. Criminal groups, including some thought to be allied with state actors, such as North Korea, have used cyberspace to **extort money** from banks, municipalities, and individuals.[4](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote04) Attacks such as these occupy most of the time and attention of civilian and military cybersecurity organizations that attempt to thwart such attacks. Yet for those who worry about strategic stability and the risks of nuclear escalation, it is the threat of cyberattacks on NC3 systems that provokes the greatest concern.

This concern stems from the fact that, despite the immense effort devoted to protecting NC3 systems from cyberattack, no enterprise that relies so extensively on computers and cyberspace can be made 100 percent invulnerable to attack. This is so because such systems employ many devices and operating systems of various origins and vintages, most incorporating numerous software updates and “patches” over time, offering multiple vectors for attack. Electronic components can also be modified by hostile actors during production, transit, or insertion; and the **whole system** itself is **dependent** to a **considerable degree** on the **electrical grid**, which itself is **vulnerable** to cyberattack and is far **less protected**. Experienced “**cyberwarriors**” of every major power have been working for years to probe for **weaknesses** in these systems and in many cases have devised cyberweapons, typically, malicious software (**malware**) and computer viruses, to exploit those weaknesses for military advantage.[5](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote05)

Although activity in cyberspace is much more difficult to detect and track than conventional military operations, enough information has become public to indicate that the major **nuclear powers**, notably China, Russia, and the United States, along with such secondary powers as Iran and North Korea, have established **extensive** cyberwarfare capabilities and engage in **offensive cyberoperations** on a **regular basis**, often aimed at **critical** military **infrastructure**. “Cyberspace is a contested environment where we are in constant contact with adversaries,” General Paul M. Nakasone, commander of the U.S. Cyber Command (Cybercom), told the Senate Armed Services Committee in February 2019. “We see near-peer competitors [China and Russia] conducting sustained campaigns below the level of armed conflict to erode American strength and gain strategic advantage.”

Although eager to speak of adversary threats to U.S. interests, Nakasone was noticeably but not surprisingly reluctant to say much about U.S. offensive operations in cyberspace. He acknowledged, however, that Cybercom took such action to disrupt possible Russian interference in the 2018 midterm elections. “We created a persistent presence in cyberspace to monitor adversary actions and crafted tools and tactics to frustrate their efforts,” he testified in February. According to press accounts, this included a cyberattack aimed at paralyzing the Internet Research Agency, a “troll farm” in St. Petersburg said to have been deeply involved in generating disruptive propaganda during the 2016 presidential elections.[6](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote06)

Other press investigations have disclosed two other offensive operations undertaken by the United States. One called “Olympic Games” was intended to disrupt Iran’s drive to increase its uranium-enrichment capacity by sabotaging the centrifuges used in the process by infecting them with the so-called Stuxnet virus. Another left of launch effort was intended to cause malfunctions in North Korean missile tests.[7](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote07) Although not aimed at either of the U.S. principal nuclear adversaries, those two attacks demonstrated a willingness and capacity to conduct cyberattacks on the nuclear infrastructure of other states.

Efforts by **strategic rivals of** the United States to **infiltrate** and eventually **degrade** U.S. **nuclear infrastructure** are far **less documented** but thought to be **no less prevalent**. Russia, for example, is believed to have planted **malware** in the U.S. electrical utility grid, possibly with the intent of **cutting off** the **flow** of **electricity** to critical **NC3 facilities** in the event of a major crisis.[8](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote08) Indeed, every major power, including the United States, is believed to have **crafted cyberweapons** aimed at critical **NC3 components** and to have implanted malware in enemy systems for potential use in some future confrontation.

Pathways to Escalation

Knowing that the NC3 systems of the major powers are constantly being probed for weaknesses and probably infested with malware designed to be activated in a crisis, what does this say about the risks of escalation from a nonkinetic battle, that is, one fought without traditional weaponry, to a kinetic one, at first using conventional weapons and then, potentially, nuclear ones? None of this can be predicted in advance, but those analysts who have studied the subject worry about the emergence of dangerous new pathways for escalation. Indeed, several such scenarios have been identified.[9](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote09)

The first and possibly most **dangerous path** to **escalation** would arise from the **early use** of **cyberweapons** in a great power **crisis** to ~~paralyze~~ **undermine** the vital command, control, and communications capabilities of an adversary, many of which serve nuclear and conventional forces. In the “**fog of war**” that would naturally ensue from such an encounter, the recipient of such an attack might fear more punishing follow-up kinetic attacks, possibly including the use of nuclear weapons, and, **fearing** the **loss** of its own **arsenal**, **launch** its weapons **immediately**. This might occur, for example, in a confrontation between NATO and Russian forces in east and central Europe or between U.S. and Chinese forces in the Asia-Pacific region.

Speaking of a possible confrontation in Europe, for example, James N. Miller Jr. and Richard Fontaine wrote that “both sides would have **overwhelming incentives** to go **early** with **offensive** cyber and counter-space **capabilities** to **negate** the other side’s military capabilities or **advantages**.” If these early attacks succeeded, “it could result in huge **military** and **coercive advantage** for the attacker.” This might induce the recipient of such attacks to back down, affording its rival a major victory at very low cost. Alternatively, however, the recipient might view the attacks on its critical command, control, and communications infrastructure as the **prelude** to a **full-scale attack** aimed at **neutralizing** its **nuclear capabilities** and choose to strike first. “It is worth considering,” Miller and Fontaine concluded, “how even a very limited attack or incident could set both sides on a slippery slope to rapid escalation.”[10](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote10)

What makes the insertion of **latent malware** in an adversary’s NC3 systems so **dangerous** is that it may not even **need** to be **activated** to **increase** the **risk** of **nuclear escalation**. If a nuclear-armed state comes to believe that its critical systems are infested with enemy malware, its leaders might **not trust** the information provided by its early-warning systems in a crisis and might **misconstrue** the **nature** of an **enemy attack**, leading them to **overreact** and possibly **launch** their **nuclear weapons** out of **fear** they are at **risk** of a **preemptive strike**.

“The **uncertainty** caused by the unique character of a cyber threat could **jeopardize** the **credibility** of the **nuclear deterrent** and **undermine strategic stability** in ways that advances in nuclear and conventional weapons do not,” Page O. Stoutland and Samantha Pitts-Kiefer wrote in 2018 paper for the Nuclear Threat Initiative. “[T]he introduction of a **flaw** or **malicious code** into nuclear weapons through the **supply chain** that **compromises** the **effectiveness** of those **weapons** could lead to a **lack** of **confidence** in the **nuclear deterrent**,” undermining strategic stability.[11](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote11) Without confidence in the reliability of its nuclear weapons infrastructure, a nuclear-armed state may misinterpret confusing signals from its early-warning systems and, fearing the worst, launch its own nuclear weapons rather than lose them to an enemy’s first strike. This makes the scenario proffered in the 2018 NPR report, of a nuclear response to an enemy cyberattack, that much more alarming.

**1AC — Plan**

**Plan: The United States federal judiciary should substantially increase prohibitions on private sector conduct that is more restrictive of competition than reasonably necessary to enable creation of information technology standards.**

**1AC — Solvency**

**Solvency —**

**The plan requires SSO’s to administer reasonable action to prohibit ex post opportunism---that strengthens FRAND effectiveness while enabling SEP holders to capture appropriate royalties---which is the best competition-innovation balance.**

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3. Application of the Basic Legal Principles

The antitrust principle is **straightforward**: industry-wide collaboration through SSOs to establish procompetitive standards is **permitted** only if it is **no more restrictive** of competition than **reasonably necessary** to enable creation of the standards. When standard setting predictably creates technology **monopolies** that, if unrestrained, will enable **anticompetitive** ex post **opportunism** that would otherwise not occur, an SSO that **does not** take **effective** measures to prevent or minimize such ex post opportunism engages in conduct that is **more restrictive** of competition than necessary. In that case, the SSO and, in appropriate cases, its members, may well **violate Section 1** of the **Sherman Act**.

Under this principle, SSO procedures and FRAND rules should be **evaluated** based on whether they lead to **reasonable** SEP **royalties**, using the competitive ex ante licensing standard discussed above, which has been **adopted** by the courts in patent law. Put differently, FRAND rules should be evaluated based on their ability to prevent SEP holders from obtaining **more** than the **ex ante value** of their **technology** from implementers.

This limitation **would not** prevent a SEP holder from **proﬁting**, perhaps **greatly**, from participating in the SSO and having its patented technology included in the standard. The SEP holder **continues** to be **rewarded** for its technology because the inclusion of its technology in the standard can still **greatly increase** the volume of licensing opportunities available to the SEP holder.

Whether a particular set of FRAND rules are sufficiently effective in preventing ex post opportunism will depend on the particular circumstances. The procedural unfolding of the case will also depend upon the circumstances. As a general matter, the case would probably be structured as an ordinary **Rule of Reason** case.82

First, the plaintiff would have to demonstrate **harm** to **competition** as a result of the collaboration of the SSO’s members, many of which compete with one another. In this case, the harm to competition would stem from the ability of the SEP holder to exercise **monopoly** power by obtaining royalties in **excess** of the **competitive**, ex ante level. The decision to include patented technologies in the standard would be the allegedly **unlawful** agreement. Notably, the court **need not** determine what a FRAND royalty is; it would **suffice** to **determine** that **market power** has been **created** or **exercised**, and that existing SSO rules and policies were **not adequate** to prevent the competitive harm. The defendant, which could be the SSO or perhaps one or more SSO members, would win at this point if the plaintiff failed to show harm to competition. If might fail if the standard faces substantial competition and the court concludes that the SEP holder therefore does not have market power or if the SSO’s rules and policies are found to be effective in preventing ex post opportunism, even if the plaintiff or even the court thinks that other rules and policies would be preferable.

Second, if the plaintiff makes the requisite showing of harm to competition, the **defendant(s)** would then have to show some **procompetitive justiﬁcation**— in this case, the **beneﬁts** of the standard. These two initial steps should be straightforward.

Third, if as is likely the defendant is able to show a procompetitive justiﬁcation, the plaintiff would have to show that the SSO could have used available, reasonable **alternatives** to realize the **efficiency beneﬁts** with less or **none** of the competitive **harms**. The plaintiff might identify reasonable **alternatives** that would have led to a **different** standard, based on including **unpatented** technology in the standard or perhaps involving **fewer SEPs** or **fewer owners** of SEPs, which would be **less subject** to patent holdup. More likely, the plaintiff could suggest alternative SSO rules that would not change the standard, but would **reduce** the **likelihood** or extent of ex post **opportunism**. For example, the plaintiff might suggest more rigorous FRAND-type rules, such as rules that set forth more precise principles on which FRAND royalties are to be determined and the circumstances under which SEP holders might seek injunctions.

Fourth, the burden would then shift to the defendant(s) to show that the beneﬁts of the standard **could not** have been **realized** if the SSO had adopted any of the proffered **alternatives** or that those alternatives were unrealistic.83 The plaintiff would be entitled to judgment if the court concludes that those beneﬁts could have been realized with less competitive harm if the SSO had adopted the standard with different IPR rules or policies.

Our overall sense, based on experience and the empirical literature, is that the extant FRAND rules are generally useful, but tend to be **inadequate** because they are **imprecise** and leave **unresolved** such critical issues as (a) the meaning of a **reasonable** royalty, even conceptually; (b) the meaning of “**non-discriminatory**;” (c) to whom licenses must be offered; and (d) under what circumstances may a SEP holder obtain an injunction.84 These **imprecise** FRAND commitments are therefore **not sufficient** to adequately prevent ex post opportunism. The recent revisions to IEEE’s FRAND policy represent a signiﬁcant step in the right direction, but even this advance leaves important questions **unanswered**.85 If FRAND rules are inadequate in these ways, litigation involving extant FRAND rules would likely be resolved only at the ﬁnal, fourth step. The defendant would be able to **demonstrate** the **beneﬁts** created by the standard; the plaintiff would be able to demonstrate the **creation** of **market power** and that other reasonable and practical rules or policies would **ameliorate** the problem. The case would thus turn on whether the defendant is able to demonstrate that signiﬁcant beneﬁts associated with standardization could not have been realized if the SSO had adopted those other rules or policies.

The court would have **available** a **variety** of **possible remedies** if the plaintiff prevails. Implementers that paid supracompetitive royalties or were unlawfully excluded in whole or in part from product markets as a result of the inadequate FRAND policies would be **entitled** to **damages** and, in some cases, to **treble damages**.86 If the unlawful SSO conduct is regarded as the **collective action** of the SSO and its members, which is likely to be the case in most instances, SSO members would be **jointly** and **severally liable** for the damages. Forward-looking injunctive relief aimed at restoring competition would need to be fashioned to the requirements of the individual case. For example, a court could order the SSO to adopt a new rule or policy proposed by the plaintiff. If the court is reluctant to take on that governance role, it might give the SSO a period of time—maybe ninety days—to develop a rule, subject to the court’s ultimate approval, which would adequately ameliorate the competitive problem created by the SSO. Alternatively or in addition, the court might order the parties to attempt to **negotiate** a **rule** or policy on which they can agree. And, depending on the circumstances, the court might order SEP holders, including at least those that were defendants in the case, to comply with the new SSO rules and policies.

**Threatening antitrust liability lures SSO’s into adopting best practices.**

**Lemley & Shapiro 13**, \*Mark Lemley is the William H. Neukom Professor at Stanford Law School and a partner at Durie Tangri LLP; \*Carl Shapiro is the Transamerica Professor of Business Strategy at the Haas School of Business, University of California at Berkeley and a Senior Consultant at Charles River Associates; (2013, “A SIMPLE APPROACH TO SETTING REASONABLE ROYALTIES FOR STANDARD-ESSENTIAL PATENTS”, (https://faculty.haas.berkeley.edu/shapiro/frand.pdf)

Under our approach, many of these issues should become moot, since the patentee cannot obtain an injunction (or transfer the patent to someone who can) against a willing licensee, and since competitors are not involved in jointly setting the reasonable royalty rate. If SSOs set clear, reasonable rules following the best practices we recommend, and parties follow those rules, there should be **little** or **no need** for **antitrust** to **intervene**. Indeed, even the risk of non-disclosure of a patent is lessened, since the patentee has committed to license its essential patents whether or not it discloses them. For the most part, the rules we have described are **self-executing**, meaning that even if a party tries to break the rules set by the SSO there still may be no need for antitrust to intervene. Thus, we suggest that **parties** who **abide** by these **procedures**—patentees, implementers, and the SSOs themselves—should be **immune** from **antitrust liability** for activities that merely follow those rules.107 They have entered into an arrangement that is **on balance good** for **competition**, one that allows patentees to receive **reasonable royalties** but **prevents holdup** and **reduces** the risk of **monopolization** by **trickery**.

The fact that antitrust remains a last resort available when SSOs don’t follow best practices may have two practical benefits, however. First, under our approach the **promise** of **avoiding** the risk of **antitrust liability** will be a **powerful incentive** for both SSOs and patent owners to **adopt** the **best practices** we propose. Second, the risk of antitrust liability may be relevant when an individual patentee wants to adopt best practices but the SSO governing the standard has not yet done so. We propose that a patentee that unilaterally commits to the FRAND procedures we describe here should be immune from antitrust liability for following these procedures.108 A patentee’s unilateral binding commitment to arbitration could be enforced whether or not it was elicited by an SSO. Thus, just as the prospect of antitrust immunity might **lure SSOs** to **adopt best practices**, it might also lure **patentees** to **implement** those **practices** even if the SSO has not done so. Given the large number of standard-essential patents based on preexisting standards,109 and given that SSOs tend to update their IP rules rather slowly,110 this is **not** a **small matter**.

**Only antitrust enforcement creates a consumer-action feature that counterbalances SSO’s conspiratorial incentives---private action fails.**

**Melamed & Shapiro 18**, \*A. Douglas Melamed is Professor of the Practice of Law at Stanford Law School; \*Carl Shapiro is the Transamerica Professor of Business Strategy at the Haas School of Business at the University of California at Berkeley; (May 2018, “How Antitrust Law Can Make FRAND Commitments More Effective”, <https://www-cdn.law.stanford.edu/wp-content/uploads/2018/05/How-Antitrust-Law-Can-Make-FRAND-Commitments-More-Effective.pdf>)

2. Why Antitrust Enforcement Is Necessary

Some SSO members have an interest in ensuring that the SSO takes steps to minimize the potential harms from the SEP holders’ monopoly power, and this undoubtedly explains in part why most SSOs have adopted FRAND policies or similar requirements. But, as shown in the economic model in the Appendix,73 SSOs **cannot** in general **be counted on** to adopt effective FRAND policies. The bases for this conclusion, which is central to our argument for the applicability of Section 1 to SSO FRAND rules, can be summarized as follows.74

First, the SSO members **collectively have an interest** in permitting SEP holders to charge supracompetitive royalties that elevate the downstream price of compliant devices to the monopoly level. Doing so will enable the members **in aggregate** to collect **increased revenues** from consumers, and thus to generate **increased profits** that in theory could be **shared by all** the members. In other words, supracompetitive royalties can enrich industry participants as a group at the expense of final consumers. This fact alone should serve as a **clear and strong signal** regarding the **dangers** of counting on SSOs to implement effective FRAND policies: if the SSO members negotiate **efficiently**, the outcome will be **just as bad** for consumers as if the members agreed to **fix downstream prices**.75 The **fundamental problem** is that **final consumers** are **not at the table** when the SSO rules are negotiated.

Second, SSO members that own SEPs but earn little or no profits as implementers have a **powerful self-interest** in being able to exercise the ex post monopoly power associated with their SEPs. Because SSO policies are usually determined by a **consensus** process, these members will likely be able to **block the adoption** of **fully effective FRAND policies**. Moreover, these SSO members often have the greatest interest in SSO patent policies. Since much of their income may be attributable to patent licensing, they can be expected to devote substantial resources to block the adoption of FRAND policies that effectively prevent patent holdup.

Third, even SSO members that earn **significant profits** as implementers may have **mixed incentives** if they also own SEPs, which can also lead to **weak or in-effective FRAND rules**. In the Appendix, we show that, if the **requisite share** of votes in the SSO are cast by firms whose **share of SEP royalties** is at least as large as their share of **downstream profits**, and if these firms can coordinate their voting over the FRAND rules, then an SSO **unconstrained** by antitrust laws will establish FRAND rules leading to an outcome **no better for consumers** than would result from an **integrated monopolist** controlling all SEPs and all downstream sales.76

Fourth, even SSO members that are **downstream implementers** and own few, if any, SEPs may have only a **modest interest** in promoting effective policies to restrict ex post opportunism. Because all implementers will be subject to the opportunism, all of them will face **increased licensing costs**, and therefore will likely be able to **pass on** most or all of the **increased costs** to their customers.77 Furthermore, these implementers might not be **especially active** or **effective** in the standard-setting process for **free-riding** or **public-good** reasons, especially if SEP royalties constitute only a **relatively small portion** of the costs of their standard-implementing products. Public choice theory predicts that the highly motivated SEP holders are likely to have the **greatest influence** over **patent policies**.

Empirical evidence bears out these concerns. As a starting point, we find it striking that SSO FRAND rules are almost **always quite vague**.78 Notably, SSOs in which SEP holders are more prevalent tend to have weaker FRAND rules.79 Further, to our knowledge, SSOs have made almost **no effort** to enforce their FRAND rules and have, instead, **left enforcement** efforts to **others**.80 This evidence raises serious doubts about the effectiveness of the existing FRAND rules in preventing ex post opportunism.

#### Antitrust is critical---the broad standing and available remedies afforded are vastly superior to any other types of law.

Cary et al. 11, \*Messrs. George Cary and Alex Sistla are members of the California and District of Columbia Bars. Mr. Mark Nelson is a member of the New York and District of Columbia Bars. Mr. Steven Kaiser is a member of the New Jersey and District of Columbia Bars; (2011, “THE CASE FOR ANTITRUST LAW TO POLICE THE PATENT HOLDUP PROBLEM INSTANDARD SETTING”, <https://www.clearygottlieb.com/~/media/organize-archive/cgsh/files/publication-pdfs/the-case-for-antitrust-law-to-police-the-patent-holdup-problem-in-the-standard-setting.pdf>)

III. CONCLUSION

Patent holdup where a patentee has deceived an SSO in order to secure a position in the standard is, at its core, an antitrust problem. In this context, patent holders harm consumers by exploiting the competition-reducing aspects of standard setting to their own private advantage. In addition to being the body of law directed toward anticompetitive conduct, antitrust provides numerous practical advantages, including the possibility of governmental enforcement, and appropriately broad standing.

Remedying the patent holdup problem exclusively through non-antitrust legal remedies would be perverse. Indeed, it would be a bit like remedying patent infringement through the doctrine of common law conversion. In some instances, it might work, but there certainly would be under-enforcement.

To be sure, there are instances where deceptive conduct by the patentee does not harm competition and, in those instances, there is no antitrust claim. Often there will be patent remedies in that situation, or contract or even tort remedies. The legal regimes can and do coexist peacefully.

Those who argue that the marginal benefit of antitrust remedies do not out-weigh the cost of antitrust litigation both understate the benefits (broad standing and ready remedies where appropriate) and overstate the costs (the potential, however unknown, of “false positives,” i.e., condemning behavior that is not anticompetitive). In addition to being overstated, the false positives concern is also misplaced in this context. Unlike an antitrust attack on price cutting or a securities offering, the risk of a false positive here is not the over-deterrence of desired behavior, but rather that over-deterrence of deceptive and opportunistic behavior. Fretting about that form of over-deterrence seems itself to be a misallocation of resources. And preventing that form of over-deterrence by reliance on the competitive outcomes under legal regimes not designed to protect competition strikes us as unwise.

#### \*Ex ante disclosure solves lock-in, improves transparency and openness.

Contreras 13, \*Jorge L. Contreras is a Presidential Scholar and Professor of Law at the University of Utah with an adjunct appointment in the Department of Human Genetics. He is a graduate of Harvard Law School (JD) and Rice University (BSEE, BA); (Contreras, J. L. (2013). TECHNICAL STANDARDS AND EX ANTE DISCLOSURE: RESULTS AND ANALYSIS OF AN EMPIRICAL STUDY. Jurimetrics, 53(2), 163-211. Retrieved from https://www2.lib.ku.edu/login?url=https://www.proquest.com/scholarly-journals/technical-standards-ex-ante-disclosure-results/docview/1428261870/se-2?accountid=14556)

Ex ante disclosure of licensing terms could potentially alleviate the causes of such disputes by making a patent holder's royalty rate known before lock-in of a standard. Thus, if maximum royalty rates were known in advance, it would be more difficult for an implementer to argue that such rates were unreasonable (as the SDO could have chosen an alternative technology if this were the case).148 Lacking this potential defense against an infringement claim by the patent holder, implementers might be more inclined to negotiate with patent holders before the adoption of a standard. By the same token, if a patent holder knew that its maximum royalty rate would be scrutinized before the approval of a standard, and that SDO participants would be free to consider alternative, less costly technologies, it would have an incentive to disclose a royalty rate that was as reasonable (or low) as possible.149

Ex ante disclosure of licensing terms has an intuitive appeal. Like the prices of menu items at a restaurant, it has been argued that the royalty rates for standards-essential patents should be disclosed before product vendors (diners) are locked into costly technology choices. But critics of ex ante disclosure have argued that requiring early disclosure of licensing terms will impede standards-development processes and create additional legal risks for participants. To assess the validity of these complaints, we studied ex ante licensing disclosures at VITA, IEEE and IETF and found no evidence that such policies resulted in measurable negative effects on the number of standards started or adopted, personal time commitments or quality of standards, nor was there compelling evidence that ex ante policies caused the lengthening of time required for standardization or the depression of royalty rates. There was evidence to suggest that the adoption of ex ante policies may have contributed to positive effects observed on some of these variables. In addition, a significant majority of participants in VITA, the only SDO adopting a mandatory ex ante policy, felt that the information elicited by the organization's ex ante policy improved the overall openness and transparency of the standards-development process. Thus, while there are numerous areas in which further study and analysis may be warranted, and other organizations in which the implementation of ex ante policies may have different effects, we concluded that the process-based criticisms of ex ante policies and the predicted negative effects flowing from the adoption of such policies are not supported by the available evidence.

#### Use consequentialism---evaluating causal outcomes is most ethical. “You link, you lose” diverts political responsibility for atrocity---which turns the alternative.

Zanotti 17, \*Laura Zanotti, Associate Professor Department of Political Science, Virginia Tech, (January 13th, 2017, “Reorienting IR: Ontological Entanglement, Agency, and Ethics,” International Studies Review)

Furthermore, if we accept Barad’s position that we are “of the world” and not above the world, theorizing looks more like a practice endowed with performative political effects than a quest for the discovery of the “true nature” of what exists. Therefore, intellectual undertakings are a form of political agency and come with great responsibility. Such responsibility requires the need for exercising prudence in making truth statements about what is universally good or naturally inevitable. Assumptions about linearity of causal relations, universal laws of history, or ontological properties of entities yield two problematic effects. On the one hand, they may stifle political imagination; on the other hand, they could encourage actions based upon abstract prescriptions rather than upon careful diagnosis of the forces that obtain in the situation at hand. In an entangled world, there are no externalities. Arguments that divert responsibility by basing political choices upon abstract principles or aspirations and, as a result, that treat what happens on the ground as “unintended consequences” or “collateral damage,” are ethically thin and politically dangerous.

In fact, unintended consequences may well be the result of irresponsible political decision-making that does not include a competent assessment of the practical configurations that constitute the context of action and the means necessary to achieve stated goals. Such attitudes, Amoureux and Steele (2014) have suggested, have led to disastrous initiatives, such as the Bush administration’s invasion of Iraq. Likewise, Kennedy (2006) has shown that the bland rhetoric of jus in bello that provides standardized criteria regarding the number of acceptable civilian casualties (conveniently called collateral damage) produces the effect of diverting responsibility from those who conduct war while assuaging their consciences concerning the injuries and deaths their choices are inflicting. Kennedy (2004) has also shown that as a result of the preference for universal normativity, the human rights profession (which he calls “the invisible college”) is more concerned with protecting abstract norms than with acting politically so as to devise viable solutions to specific problems.

Universal norms and bureaucratic routines play a major role in prescribing and justifying UN peacekeeping interventions. As Jean Marie Guehe ́nno argued more than a decade ago, strategies of international intervention based upon assumptions of causal linearity and invariance may amount to hubris. Norms and rules can also offer grounds for appeasement. The massacres that occurred in Rwanda and Srebrenica in the 1990s provide examples of how, by uncritically following institutionalized rules, United Nations peacekeepers permitted atrocities. UN employees are not cold-blooded monsters or extremely callous individuals. They follow norms and rules, key examples of which include the principle of “impartiality,” Security Council mandates, and “rules of engagement.” By doing so, however, they have often fallen short of considering the possible consequences of decisions in specific situations. The United Nations’ failure to take action to prevent the Rwanda and Srebrenica genocide testifies to the fact that following universal norms (i.e., the imperative to preserve impartiality) and bureaucratic reasoning (i.e., the rules of engagement prescribing not to intervene to disarm any party of the conflict) set the stage for avoiding a careful assessment of what was at stake on the eve of the massacres. These ways of reasoning also appeased consciences for not making decisions accountable to the people in danger (Zanotti 2014).

# 2AC

## Adv — Innovation

#### 1---there’s no impact to winning this argument.

Cotter et al. 19, \*Thomas F. Cotter, Briggs and Morgan Professor of Law, University of Minnesota Law School; Innovators Network Foundation Intellectual Property Fellow; \*Erik Hovenkamp, Assistant Professor, USC Gould School of Law; \*Norman Siebrasse, Professor of Law, University of New Brunswick Faculty of Law; (2019, “Demystifying Patent Holdup”, https://scholarlycommons.law.wlu.edu/cgi/viewcontent.cgi?article=4667&context=wlulr)

B. Patent Holdup Is Not a Problem, Because It Is Not Systemic

A second, related argument is that there is no empirical evidence of patent owners engaging in pervasive, systemic patent holdup in the very industries holdup theorists are most concerned with (e.g., telecommunications).139 Indeed, according to the critics, if holdup were pervasive one would expect innovation and growth in the affected industries to “stagnate, wither, or die,”140 whereas if one looks “across human history, it is not clear that the commercialization of complex technologies has ever been faster than it is today in those industries that reform proponents point to as most plagued by the patent holdup ‘problem.’”141

Although we agree that whether, or to what extent, patent holdup occurs in the real world is ultimately an empirical matter, the implication that patent holdup is a problem only if it is “pervasive” or “systemic” is a non sequitur.142 If our analysis above is correct—that the ability to engage in patent holdup depends on path dependence, that settings conducive to patent holdup are not uncommon, and that the three components of a holdup royalty can exist independently of one another—patent holdup does not have to be systemic to be capable of reducing social welfare. Seeing how the empirical critiques of patent holdup do “not claim[ ] that individual firms never attempt to engage in behavior that can be characterized as holdup,”143 the conclusion that holdup is not systemic may well be accurate, for all we know, while still being of any limited relevance for purposes of determining whether injunctive relief should issue on the facts of any one particular case.144 If the choice were between always granting an injunction without tailoring or conditions, and never granting any form of injunctive relief, perhaps the question of whether holdup was systemic, at least in a particular industry, would be central. But the traditional approach to injunctive relief looks to the facts of the particular case.145

#### Don’t trust authors from GMU’s Mercatus Institute (or Global Antitrust Institute).

McLaughlin 21, Bloomberg, (David, March 12th, 2021, “One Tech-Funded University Helped Shape FTC’s Hands-Off Approach”, <https://www.bloomberg.com/news/articles/2021-03-12/how-george-mason-university-shaped-ftc-s-hands-off-approach-to-tech>)

* Alden Abbott, Jonathan Barnett are both fellows at George Mason University’s Center for Intellectual Property and Innovation Policy (funded by Qualcomm)
* Joshua Wright is a former FTC commissioner who taught at the institute and lobbied for Qualcomm

The [Tech Transparency Project](https://www.techtransparencyproject.org/) (TTP), a watchdog group in Washington, details in a new report an unusually close relationship between the law school at Virginia’s George Mason University and the Federal Trade Commission. By helping shape the workforce of the FTC, the group claims, the school infused it with a laissez-faire philosophy favorable to the school’s tech donors.

[The report](https://www.techtransparencyproject.org/articles/big-techs-backdoor-ftc) throws a harsh light on the FTC’s hands-off approach to tech companies over the past decade. As the agency prepares to argue the lawsuit against [Facebook Inc.](https://www.bloomberg.com/quote/FB:US) that it filed late last year, seeking to break up the social media giant, it must contend with an inconvenient fact: It approved Facebook’s acquisitions of Instagram in 2012 and WhatsApp in 2014—the very mergers it now seeks to undo. The FTC’s consent to those deals is cited by critics as evidence of a permissive attitude that allowed tech companies to grow into leviathans.

One explanation for its lenience, the TTP report charges, is that the industry used a corner of academia to capture the agency. According to the report, which was published on March 12, Silicon Valley donated substantial sums to George Mason’s Antonin Scalia Law School, which built a pipeline of professors and graduates who went to work at the FTC. Dozens of people went from the school to the regulator—commissioners, bureau heads, attorney-advisers, legal interns—during the Obama and Trump administrations.

Under President Trump alone, professors and graduates of Scalia Law, and heads of affiliated programs at George Mason, served as the FTC chair, general counsel, policy planning head, and leaders of its three main divisions: the bureaus of competition, consumer protection, and economics.

Katie Paul, who heads the TTP, says an investigation is needed into “whether George Mason University has effectively become Big Tech’s back door into the FTC, giving the companies an undisclosed way to sway its decision-making and hobble enforcement action.”

Revolving Door

Large tech companies have donated to two programs affiliated with Scalia Law, the Global Antitrust Institute and the Law & Economics Center. From January 2018 to the end of last year, [Google](https://www.bloomberg.com/quote/GOOGL:US) donated $900,000, [Amazon.com Inc.](https://www.bloomberg.com/quote/AMZN:US) contributed $925,000, and Facebook Inc. gave $675,000, according to documents obtained by Bloomberg Businessweek through a public records request. Google, Amazon, and Facebook declined to comment on their donations.

The law school says the ties between its faculty and the FTC aren’t unusual. Alison Price, a senior associate dean, says it’s common for professors to work for federal agencies and then return to their teaching jobs. “Since Scalia Law has special expertise and a relatively large faculty in antitrust, it’s logical that our faculty is called to serve with frequency,” she says. “But faculty don’t set policy; administrations do.”

The Tech Transparency Project is part of a larger watchdog group, [Campaign for Accountability](https://campaignforaccountability.org/). The TTP website cites several philanthropists as donors, including George Soros’s Open Society Foundations. Oracle Corp. had been a donor to a TTP predecessor group that focused mostly on Google, but the TTP says it no longer accepts corporate funding.

Both George Mason programs, which host conferences and offer training for judges and antitrust enforcers, promote the consumer-welfare standard articulated by Robert Bork, the late federal judge and Yale Law School professor. That standard, the guidepost for regulators and courts since the 1980s, looks to price increases as a gauge of competitive harm. It is blamed by some antitrust experts for handcuffing enforcers when it comes to policing tech companies.

The tech companies’ donations are drawing scrutiny. At a hearing on Feb. 25, New York Democratic Representative Mondaire Jones called Abbott “Tad” Lipsky, a former FTC official now at the [Global Antitrust Institute](https://gai.gmu.edu/), “a wolf in sheep’s clothing.” As he testified against proposals to give the antitrust laws more teeth, Lipsky drew Jones’s scorn. Programs such as the GAI “have worked to teach judges and regulators to let their guard down as corporate funders like yours came to dominate our economy,” Jones said. Lipsky responded that his antitrust views predated “any of these digital technology companies.”

A key figure in the law school-to-regulator pipeline is Lipsky’s boss, Joshua Wright, an FTC commissioner from 2013 to 2015. He now teaches antitrust law at George Mason while also running the GAI.

Wright wielded outsize influence at the agency, pushing through a 2015 policy statement in an attempt to rein in the agency’s enforcement power. After he left he improperly lobbied the agency on behalf of Qualcomm Inc., one of the law school’s largest donors, according to a report by the FTC inspector general that was obtained by TTP and verified by Bloomberg Businessweek. His name was redacted in the report, but Wright confirmed it was about him. He says he did nothing wrong.

The New York Times last year [reported that tech companies bankrolled the work of the GAI](https://www.nytimes.com/2020/07/24/technology/global-antitrust-institute-google-amazon-qualcomm.html) and that Wright had worked with corporate donors to fend off critics. The extent of the revolving door between the FTC and the law school, and Wright’s alleged violation of ethics laws, haven’t been previously reported.

Many companies support higher education, and many universities send professors and graduates to Washington. But George Mason is unique in cultivating a specific regulator, says Jeff Hauser, executive director of the [Revolving Door Project](https://therevolvingdoorproject.org/), which tracks government officials’ corporate ties.

“In terms of feeding directly into a government agency, I’m not aware of any equivalent at the SEC or the EPA or anything else,” he says, referring to the Securities and Exchange Commission and the Environmental Protection Agency.

A public university in the northern Virginia suburbs of Washington, George Mason is home to the free-market think tank the [Mercatus Center](https://www.mercatus.org/). It is a leader in the study of applying economic analysis to the law, emphasizing that markets work best when government regulates less. The university became known as a haven for conservatives at the end of the Reagan administration in 1988. Even Bork taught there after stepping down from the bench in 1988.

The George Mason conduit was steady and robust, according to the TTP, which details dozens of examples of people moving between the FTC and the law school over the past decade. One is James Cooper, who directs an economics and privacy program at the Law & Economics Center. He simultaneously taught at the school and served as a deputy director for the FTC’s Bureau of Consumer Protection.

Cooper was among the academics who urged House lawmakers last year to reject proposals to break up tech companies and make merger approvals more difficult. George Mason’s Wright, Lipsky, and John Yun, a professor at the law school who was an economist at the FTC, joined the filing. Cooper didn’t respond to a request for comment, and Yun declined to comment.

But Wright, the former FTC commissioner, perhaps best embodies the ties linking the FTC to the law school and its donors. After leaving the agency in 2015, Wright simultaneously taught at George Mason, ran the GAI, and worked for the Wilson Sonsini Goodrich & Rosati law firm, where he represented Qualcomm.

The FTC sued Qualcomm in January 2017 in a monopoly case that was developed while Wright was an FTC commissioner. Wright tried to broker a settlement about four months after the case was brought. He met Lipsky, then the acting director of the FTC’s competition bureau, for lunch at a steakhouse in Washington and tried to set up an additional meeting with agency officials, according to the inspector general’s report.

In doing so, Wright violated an ethics law that bans officials for life from lobbying on issues they worked on “personally and substantially,” according to the inspector general. Those findings were referred to the Department of Justice’s public integrity section. The Justice Department, which decided not to prosecute, declined to comment.

Lipsky resigned two months after his lunch with Wright, who then hired him at the GAI. Lipsky didn’t respond to a request for comment.

“I never made any appearance at the FTC involving its enforcement action against Qualcomm or discussed the merits of the case with any FTC official,” says Wright, who declined to elaborate on the specifics of the investigation. “I immediately complied when the FTC ethics office informed me that I should not make any appearance based upon a single preliminary vote I had cast years before the case was filed.”

Qualcomm contributed almost $5.8 million to the George Mason law school programs from 2016 through 2020. Less than two months before Wright met with the FTC to try to settle the Qualcomm case, the company gave $525,000 to the GAI. The company didn’t respond to requests for comment.

Tech companies that donate to George Mason collaborate with the school’s professors on projects, according to emails obtained through a public records request.

#### Big Tech funding sinks their ev credibility.

Mullins and Nicas 17, \*Brody Mullins is an investigative reporter in the Washington D.C. bureau of The Wall Street Journal where he covers business, lobbying and campaign finance; \*Jack Nicas covers Google and other companies owned by Alphabet Inc. He is based in The Wall Street Journal's San Francisco bureau; (July 14th, 2017, “Paying Professors: Inside Google’s Academic Influence Campaign”, https://www.wsj.com/articles/paying-professors-inside-googles-academic-influence-campaign-1499785286)

Ms. Feldman and other critics of the funding say even disclosing money received from a company that has benefited from the research can give the appearance of a conflict of interest and undermine academic credibility.

“Yeah, the money is good but it does get in the way of objective academic research,” said Daniel Crane, a University of Michigan law professor. He said he turned down Google’s offers to fund his research that opposed antitrust regulation of internet search engines. “If I am reading an academic paper, and they disclose an interest with a party with an interest in the outcome,” he said, “you take [the research] with a grain of salt.”

Paying for favorable academic research has long been a tool of influence by U.S. corporations in food, drug and oil industries. Scandals involving conflicts of interest in medical research have spurred many medical schools, scientific researchers and journals to require disclosure of corporate funding and to prohibit corporate sponsors from meddling with findings.

The tech industry now includes the world’s top five companies by market value: [Apple](https://www.wsj.com/market-data/quotes/AAPL) Inc., Google parent [Alphabet](https://www.wsj.com/market-data/quotes/GOOG) Inc., [Microsoft](https://www.wsj.com/market-data/quotes/MSFT) Corp. , [Amazon.com](https://www.wsj.com/market-data/quotes/AMZN) Inc. and [Facebook](https://www.wsj.com/market-data/quotes/FB) Inc.

Several of the companies also are active in funding academic research. Microsoft has paid Harvard business professor Ben Edelman, the author of papers saying Google abuses its market dominance. Chip maker [Qualcomm](https://www.wsj.com/market-data/quotes/QCOM) Inc. funded papers supporting its side of a fight against Google over patents. And telecommunication giants [Verizon Communications](https://www.wsj.com/market-data/quotes/VZ) Inc. and [AT&T](https://www.wsj.com/market-data/quotes/T) Inc. have funded various papers against Google. The companies either declined to comment or didn’t respond to requests for comment.

## Advantage — Cyber

## Solvency

#### Warming magnifies settler impositions

Whyte 16. Kyle Powys Whyte, Michigan State University Timnick Chair in the Humanities, Associate Professor of Philosophy and Community Sustainability In Press. “Is it Colonial Déjà Vu? Indigenous Peoples and Climate Injustice” November 2016. . Humanities for the Environment: Integrating Knowledges, Forging New Constellations of Practice. Edited by Joni Adamson, Michael Davis, and Hsinya Huang. Earthscan Publications. Pages 88-104. ckm-eg.

Climate change fits succinctly within this pattern. For this reason, many contemporary Indigenous peoples are concerned about their vulnerability, or susceptibility to be harmed, by impacts associated with the observed rise of global average temperature, or climate change. That is, they are concerned about climate risks as they are increasingly confronted by change stemming from the carbon intensive economic activities of settler and other colonial societies. Climate change impacts can be seen through the lens of forms of containment (among other forms of domination), this time arising from settler contributions to increasing the concentration of greenhouse gases in the atmosphere. Warming waters and receding glaciers affect the fish habitats in Indigenous territories all over the world, such as on the Pacific coast of North America where many Tribal nations harvest salmon for economic and cultural purposes (Bennett et al.). Sea level rise is pushing people living in the Village of Kivalina in Alaska, the Isle de St. Charles in the Gulf of Mexico, and the Carteret Atoll in Papua New Guinea to relocate (Maldonado et al.). In these cases we see 8 both shrinking habitats and relocation occurring again. The Loita Maasai peoples in Africa face droughts that affect the rain conditions required for performing many of their ceremonies (Saitabu). Indigenous women, girls and two spirit persons in the Arctic and Great Plains regions are subject to greater sexual violence, abuse and trafficking as work camps for oil and gas extraction, such as ‘fracking,’ bring in male contractors to profit from the resources found within Indigenous territories (Sweet). Climate change impacts and drivers represent another form of inflicted anthropogenic environmental change. Scientific reports confirm many of the threats just described. In 2014, the U.S. National Climate Assessment states that Indigenous peoples face the ‘loss of traditional knowledge in the face of rapidly changing ecological conditions, increased food insecurity… changing water availability, Arctic sea ice loss, permafrost thaw, and relocation from historic homeland’ (Bennett et al. 2). The Intergovernmental Panel on Climate Change’s Fifth Assessment Report claims Indigenous peoples face ‘challenges to post-colonial power relations, cultural practices, their knowledge systems, and adaptive strategies’ (Adger et al.). Indigenous peoples’ own descriptions of climate risk indicate that settler and other colonial societies are imposing rapid environmental change that generates otherwise preventable harms. The Mandaluyong Declaration quotes Miskito women in the Americas who say, in response to changing environmental conditions, that “We now live in a hurry and daughters do not cook as grandmothers… We do not catch fish as before, do not cook as before; we cannot store food and seeds as before; the land no longer produces the same; small rivers are drying up… I think that along with the death of our rivers, our culture dies also.” (300-01). For many Indigenous peoples, these rapid changes are experienced as a continuation of settler colonialism and other forms of colonialism that they have endured for many years. For we have experienced these types of environmentally-related impacts before— from dietary change to relocation to sexual violence—though caused by different factors, such as multiple settler institutions of containment. Though institutions of containment represent just one limited example of a much more complex history with settler colonialism. Anthropogenic climate change is of a piece with forms of nonconsensual and harmful environmental change inflicted on our societies in the past. Some Indigenous peoples look at futures of 9 rampant climate injustice as looking to the cyclical history of settler and other colonial inflictions of anthropogenic environmental change on Indigenous peoples in order to instantiate erasure. Yet what is more insidious about climate injustice against Indigenous peoples is that the settler institutions such as those of containment, that inflicted environmental change in the past, are the same institutions that fostered carbon-intensive economic activities on Indigenous territories. That is, containment strategies, such as removal of Indigenous peoples to reservations or the forced adoption of corporate government structures, all facilitated extractive industries, deforestation and large-scale agriculture. What is more, and as I will discuss in more detail in later sections, these are the same institutions that today make it hard for many Indigenous peoples to effectively cope with climate change impacts. In this way, climate injustice against Indigenous peoples refers to the vulnerability caused by ongoing, cyclical colonialism both because institutions facilitate carbon-intensive economic activities that produce adverse impacts while at the same time interfering with Indigenous people’s capacity to adapt to the adverse impacts

#### Nuclear conflict is underestimated and it leads to white elites surviving because the government believes agents of disaster should be the survivors

Scarry 19, PhD, Professor of English at Harvard (Elaine Scarry, 2019, Interview, Representations, 146.1)

RA: At the Buffalo conference on pain, you gave a paper that built on some of the insights of your then most recent book, Thermonuclear Monarchy. 1 In the book, you demonstrate the incompatibility of democracy and nuclear arms at least in part on the grounds that, by the nature of their deployment, nuclear arms make it impossible for the populace to consent to their use. In your talk, you made a different but related claim that focused on the relative silence of the population regarding nuclear arms in the post-Cold War era. You were concerned, in particular, with the difficulties of imagining the consequences of nuclear war. I wonder if you could expand on this second point: why it is so hard to think about nuclear war. ES: The two points are deeply related. The architecture of nuclear arms requires that the population be eliminated from the decision about going to war. It also requires that Congress be eliminated from the decision about going to war—just because the nature of the technology requires a tiny number of people to do the launch. The result of that architecture is that people eventually, over seven decades, have internalized the fact that they’re worthless when it comes to the need to defend the country and to carry out acts of mutual aid toward one another. We now simply abandon the right of self-defense and the right of mutual aid and give unlimited injuring power to the executive branch of government and fall silent. RA: How much responsibility, how much blame, does one give to the population for remaining silent? ES: That has always been a question. Gandhi said, ‘‘You can wake a man who’s asleep, but you can’t wake a man who’s pretending to be asleep.’’ His statement marks a fork in the road. If the population has been anesthetized and is genuinely asleep, then they are morally innocent (even if infantilized and terribly reduced as moral agents). If instead the population is pretending to be asleep, we are morally culpable: the population is complicit with the genocide that’s standing in the wings waiting to happen. During my lecture and in many years of working on disarmament, I stressed the first path and tried to outline why waking up is difficult. In recent months, I’ve moved closer to the position that your question identifies, the responsibility of the population. I feel the force of Martin Luther King’s statement, ‘‘There comes a time when silence is betrayal.’’ I’m almost at the point of believing that there is a wanton refusal to [recognize] ~~see~~ the imminent peril, a refusal to understand not just that we have a responsibility to reverse it, to dismantle it, but that we have the ability to do so, and that if we don’t, it is going to happen. I don’t know if it’s going to happen this year. Or whether it’s going to happen this century. But it’s almost inconceivable that it isn’t going to happen. RA: Why is it that people have such a hard time understanding this? If you allow that people might honestly and ardently be trying to understand, what is it that is getting in the way? ES: Four or five answers come to mind. First, people often lack key pieces of information. If you ask someone in this country which nations have nuclear weapons, they are likely to say Iraq (which has none), Iran (which has none), or North Korea (which has fewer than 60; leading experts say fewer than 20). The United States has 6,500. The United States and Russia together own 93 percent of the world arsenal: the other 7 percent is owned by the other seven nuclear states—in order of numerical possession, France, China, the United Kingdom, Pakistan, India, Israel, and North Korea (see fig. 1). An equally profound misconception held by US citizens is the belief that our nuclear architecture is for ‘‘defense’’ and ‘‘retaliation.’’ In fact we have had a ‘‘presidential first-use’’ policy for the whole nuclear age. The profound obscenity of that arrangement, which has only begun to be glimpsed with the current president, has been an equally grave moral wrong from day one. Second, even when American ~~citizens~~ [denizens] and residents have this information, the outcome is derealized by its being future—that is, the unreality something has by having not yet happened is conflated with the unreality something might have by being merely imaginary. People, it’s true, are uninformed. But once they become informed, even then the flash of insight fades from their eyes after about ten minutes. RA: Why do you think that is? ES: Because they think ‘‘future’’ equals ‘‘unreal.’’ But we need to stop and understand what we mean by ‘‘future.’’ If it takes 10,000 steps to put a nuclear architecture into place, 9,999 steps have already been completed: we know how to split the atom; we know how to provide enriched uranium; we know how to deliver the bomb; we’ve completed not only the theoretical steps but the materialization steps: we’ve made the bombs; we’ve completed the delivery systems—Ohio-class submarines, the land-based ICBMs, and airdelivery B-2s and B-52s. Unlike in China and India, the weapons in the United States are already ‘‘mated’’ to the delivery systems; they are on alert; specific weapons have been assigned to specific cities in the countries of present enemies and, yes, even potential enemies. One step remains: the order to launch. So 9,999 steps are present and accounted for; one remains undone. While the 9,999 steps took vast amounts of time and resources, the last one is designed to be carried out in minutes. The word ‘‘future’’ does not apply to the 9,999 steps, only to the last one. When people decline to address the nuclear peril on the grounds that it is an ‘‘unreal’’ worry because ‘‘following the bombings of Hiroshima and Nagasaki it hasn’t yet happened,’’ they are unknowingly allying themselves with the position that our own Department of State and Department of Defense took in 1995. At that time, seventy-eight countries asked the International Court of Justice to declare the possession, threat of use, and use of nuclear weapons illegal on the basis of the humanitarian and environmental instruments such as the UN Convention on the Prevention and Punishment of the Crime of Genocide, the Geneva Protocols, the Declaration of Saint Petersburg, the Vienna Convention for the Protection of the Ozone Layer, the Rio Declaration on Environment and Poverty, and many others. Though the United States worked to invalidate the application of these protocols to our nuclear weapons one at a time, an argument they used over and over was that the firing of the weapons was ‘‘future,’’ hence ‘‘hypothetical,’’ hence ‘‘suppositional’’—this despite the billions of dollars that each year go into polishing and oiling the architecture of earth’s destruction to keep it in a present-tense state of constant readiness. RA: At the conference you also spoke about the problem of ‘‘statistical compassion.’’ ES: Let’s call that the third reason why the population is asleep. American indifference to our own genocidal nuclear architecture comes from the constraints on compassion when large numbers of people [become] ~~stand~~ to be injured. Public health physicians distinguish between narrative compassion (where one or two or three people are at risk) and statistical compassion (where thousands or millions are at risk).2 We’re fairly good at the first, and have many occasions to strengthen our capacity through daily acts of friendship and from reading literature. We’re terrible at the second, and have almost no training in strengthening our feeble abilities in this region. The nuclear peril of course entails the second: recent work on nuclear winter by Alan Robock and his colleagues shows that if even a small fraction of the current world arsenal is fired (one one-hundredth of one percent of the total available blast power), forty-four million people will be casualties on the first afternoon and one billion in the weeks following. The small shrug people make when the subject of nuclear weapons comes up—the little lift and fall of the shoulders—means they have just run a quick check on their interior brain-and-soul equipment and can report: nope, nothing in there in the way of statistical compassion. RA: Narrative compassion and statistical compassion seem to take place in widely separate spheres. How then do you see them coming into conflict with each other? ES: For me, a frightening example occurred in the Bulletin of Atomic Scientists, the wholly admirable body that sets the Doomsday Clock (now at two minutes to midnight) and that works round the clock to educate the people of the United States and the world about the hazards of nuclear weapons. Yet in commemorating the seventieth anniversary of the Nagasaki bombing in August of 2015, they published a historically factual narrative about the pilots of the plane delivering the atom bomb to Nagasaki, how many things went wrong and had to be repaired midflight. The lead-in read, ‘‘A typhoon was coming, the fuel pump failed, they had to switch planes, things were wired incorrectly, they missed their rendezvous, they couldn’t see the primary target, they ran out of gas on the way home, and they had to crash-land.’’ But the worst part was when ‘‘the Fat Man atomic bomb started to arm itself, mid-flight.’’3 The story, narrated in edge-ofyour-seat suspense, is an example of narrative compassion utterly preempting the possibility of statistical compassion: the crew might die, but if they had in fact died over the Pacific, tens of thousands of persons would not have been burned into nonexistence that day. RA: Your emphasis at the conference was on the nature of physical pain itself. ES: Yes, that was my central subject. In terms of our conversation now, we can say that a fourth and fifth reason for indifference arise from the difficulty of comprehending pain, whether it takes place in one person’s body or in the bodies of millions, and whether it occurs in the past, present, or future. (But if I were listing the reasons in the order of importance, these two would be near the top.) Once we exhaust a small handful of adjectives for physical pain, two (and almost only two) metaphors arise: the metaphor of the weapon (one may say it feels as though a knife is sticking in my shoulder blade even if it isn’t); and that of body damage (one may say it feels as though my elbow has snapped in two, even if it hasn’t). The Body in Pain concentrates on problems arising from the first; a later essay (‘‘Among Schoolchildren’’) concentrates on the second.4 Both metaphors, if carefully controlled, can help us understand the felt experience of another person’s pain; but both are highly volatile and can lead us far away from understanding. An example of the benign or genuinely expressive potential is provided by findings in neuroscience that we have mirror neurons that help us recognize another person’s physical pain. When you look at the actual experiments that were done, however, you see that the test subject is asked not to listen to a sufferer’s report of pain but to observe, for example, a pin being stuck into someone’s hand or the administration of a small electric shock. The experiments show not our comprehension of another person’s pain but our recognition of the aversivenes of being subjected to a weapon—often closely related to but by no means identical with physical pain. The very fact that a weapon can be separated from the site of the injury means that the attributes of pain can be lifted away from the sufferer and conferred on the agents inflicting the harm, so now it is not the pain that is world destroying but the inflictor of the pain. There are many examples of this in the case of nuclear weapons. For example, the mushroom cloud is often regarded as ‘‘awesome,’’ some even say ‘‘sublime.’’ But the hibakasha, the survivors in Hiroshima and Nagasaki, say, ‘‘We saw no mushroom cloud.’’ A mushroom cloud is what you see if you’re an observer far away, seated high in the sky in the airplane that dropped the weapon, or standing on the ground scores of miles beyond the radius of the harm. Like any sensible mortal, I admire J. Robert Oppenheimer, but his endlessly quoted statement following the Trinity test, ‘‘I remembered the line from the Hindu scripture ...I am become Death, the destroyer of worlds,’’ allows the scale of the injury to be transferred across the weapon and conferred on the agents, who now perceive themselves as magnificent, thrilling, almighty in their power. Oppenheimer even prefaces the quotation by saying that Vishnu here takes on a multi-armed form ‘‘to impress’’ the prince. The name he chose for the test, ‘‘Trinity,’’ shows this same fabrication of godlikeness. What if instead Oppenheimer had said, ‘‘I remembered the goddess Guanyin whose name means ‘The one who perceives the sounds of the world’ and the sounds I heard were excruciating cries, unbearable shrieks of tens of thousands scalded together in an instant of molten flesh.’’ The first statement is a fiction: Oppenheimer is neither a multi-armed god nor a three-personed god; the second statement (could we hear Guanyin) is accurate; if we could internalize and practice the second statement, we would disarm immediately. The image of the nuclear weapon, which might help make visible the pain and suffering it will bring about, instead captures the gigantic scale of the suffering, only to lift that ‘‘giganticism’’ away from the site of suffering altogether and confer it on the human agents—ordinary men, small in stature and in number, but who now appear gigantic. Insofar as any shred of ‘‘suffering’’ still remains visible, we believe it is the suffering of the nowgigantic human agent who is in mighty peril. Thus the nation spends billions of dollars on a presidential fallout shelter while convincing the public that fallout shelters for the population are ridiculous. In Thinking in an Emergency, and again in Thermonuclear Monarchy, I contrast the Swiss shelter system—Swiss law requires that every house have a fallout shelter;5 the law was reaffirmed in a 2003 referendum that had an 80 percent turnout at the polls—with the staggering constructions that have been made in the United States for... the people? no—for the president and those close to him, a shelter inside a mountain, with buildings and a lake that is, according to observers, large enough for waterskiing. One country, Switzerland, believes in what the Swiss call ‘‘equality of survival’’; the other country, the United States, believes that only the agents of nuclear [disaster] ~~holocaust~~ deserve the chance for survival. Much more detail on the multiple presidential fallout shelters is described by Garrett M. Graff in a recent book, Raven Rock: The Story of the U.S. Government’s Secret Plan to Save Itself—While the Rest of Us Die. The nuclear architecture requires that either the weapon be invisible (buried in a submarine or buried in a cornfield, like the 450 ICBMs) or, when it is visible, it must become the path across which the magnificent prowess of the human agent is seen—he’s so thrilling, so important, so vulnerable; here, please, take my tax money, use all of it to protect the man who will launch our nuclear missiles. What should bring us to our knees in sorrow and shame instead brings about a dutiful salute to the thermonuclear monarch. If one thinks fallout shelters for the population are ridiculous (ignoring the fact that the medically sophisticated Swiss have data showing otherwise), then it is informative to contrast the money lavished on our nuclear architecture with ordinary forms of safety structures for the population like bridges, dams, roads, levees. The American Society of Civil Engineers, in their 2017 report on infrastructure, gave our bridges a ‘‘Cþ’’ (56,000 are ‘‘structurally deficient’’), our dams a ‘‘D’’ (2000 have a ‘‘high-hazard potential’’), our levees a ‘‘D’’ ($80 billion is needed for structural repair), and our roads a ‘‘D’’ (one out of every five miles of highway pavement is ‘‘in poor condition’’).6 Might Americans be given a choice on whether they want their taxes spent on infrastructure or—as is currently the case—on nuclear weapons and presidential fallout shelters? Or has ‘‘no taxation without representation’’ disappeared along with all our other basic democratic principles?(112-118) RA: That all follows from the instability of the weapon; what about the second field of representation, body damage? ES: The phenomenon of body damage is like the image of the weapon but works in a much different way—almost the opposite. Whereas the problem of the weapon is its very separability from the body (and the way to make it benign is to retether it to its referent in the body), the problem of body damage is that it overlaps, overrides, and eclipses the personhood of the one underneath the damage. Either one looks away, or, if one looks, one recoils. Visual artists and writers—from Peter Paul Rubens and Andrea Mantegna in the Renaissance to fin de sie`cle artists Ka¨the Kollwitz, Aubrey Beardsley, Edvard Munch, Joris-Karl Huysmans, to twentieth-century Guatemalan writer Miguel Asturias—all solve this problem by finding a way to double the location, so that personhood remains intact in our perceptual field even if the human body is at that moment being obscenely shredded. 118 Representations If you visit the Nagasaki Atomic Bomb Museum, you will probably find yourself, as I did, surrounded by young schoolchildren, who look with courage on the visages of those who were incompletely incinerated in the bombing of that city (see figs. 2, 3, and 4). In the United States, few adults face up to the faces of those harmed there. In February of 2016, the Central Square Library in Cambridge agreed to let me—and Joseph Gerson, an American Friends Service colleague—do a monthlong program on the bombings of Hiroshima and Nagasaki with weekly lectures and an exhibit of books, drawings, and photographs. The morning after we put up the exhibit, we found all the photographs of injuries had been removed. The effort to put on an exhibit about Hiroshima and Nagasaki at the Smithsonian Institution in 1994 led to such controversy that it had to be canceled—with one exception: the Enola Gay (the plane that delivered the bomb) was put on display. Here we circle back to the phenomenon of the weapon being perceptually severed from the site of the pain. It’s in part because of museums like those in Hiroshima and Nagasaki that so many people in the Japanese population are passionately in support of nuclear disarmament. In preparation for a disarmament demonstration in New York, Cambridge and Boston activists (I include myself) worked for months to bring supporters to the march: after endless work, approximately one hundred did so. But one thousand Japanese men and women arrived that morning in New York; they carried a petition signed by six million of their countrymen, who collectively paid for the travel costs of the thousand who came. RA: Can you provide any examples of authors who ‘‘double the location,’’ as you have just described, ‘‘so that personhood remains intact’’ while the ‘‘human body is being ...shredded’’? ES: Miguel A´ngel Asturias’s Men of Maize begins with a heroic Indian in Guatemala, who ordinarily protects his people no matter what; he is able to do so, in part, because he has a level of sensory acuity that approaches genius. He knows the scent of every flower; he can discern the whole recipe of scents present in the forest in any given moment. The European colonizers can commit a slaughter of his people only if they can divert this heroic leader; and the only way to divert him is to subject him to horrible, scalding, obscene pain. Asturias must convey to us the felt experience of pain, the turning of the body inside out, and he chooses to do this through the associated phenomenon of body damage; but in order to do so without eclipsing the personhood of Gaspar Il´om, he decouples the body damage from the hero. The book opens with a dog, which the invaders have used as a test case for their pain-inducing poison laced with glass. The dog, in excruciating pain, zooms hysterically through the village square, covered with open sores, his penis erect, howling in a way that is aversive to everyone who hears and sees. This horrible scene conveys the obscenity of pain, the obscenity of bodily damage. By obscenity, I mean interior substances in the body which come before us without our consent, come before us before we are mentally prepared to comprehend what we are seeing. But the story separates this bodily desecration from the person, for now, having seen the dog, we need only be told that Gaspar Il´om has drunk this glass-laced poison to understand why he abandons his post, submerges himself in the lake, drinks all its waters, and eventually comes out. He has survived. But during the moments when he disappeared below the surface of the water, his people have been slain. RA: I wonder how you think about the role of the visual in that context. Do you think of the visual as akin to a language? ES: In visual art one can see the same phenomenon taking place, as when Ka¨the Kollwitz refuses to let an injured victim be portrayed as what Shelley called ‘‘a monstrous lump of ruin.’’ In her 1900 etching and aquatint The Downtrodden, she pushes the wounds on the body just beyond the body’s edge onto a linen sheet on which the person is lying. These mouthlike, liplike structures of open wounds are there but are not permitted to compromise figure 4. Photographs of survivors of the atomic bomb in the Nagasaki Atomic Bomb Museum. An Interview with Elaine Scarry 121 our recognition of the sufferer’s personhood. Even somebody like Aubrey Beardsley, in one of his posters, puts the wound in a tree rather than on the body of the woman. And yet the woman has attributes that make the viewer see the analogy, just like Marty South and the trees in your account of Hardy’s The Woodlanders [Scarry is referring to Rachel Ablow’s account in Victorian Pain]. Her posture, for example, is exaggeratedly erect and treelike. She wears a high-waisted skirt that is made to be a visual analogy with the tree. But our perception of her personhood remains uninterrupted. RA: One issue you have raised recently is the particular difficulty of thinking about the specific kinds of injuries caused by nuclear war, namely burns. There was a striking moment in your talk when you discussed the protocols used in burn units to help doctors and nurses in looking at burn victims. It seems so intuitively right that caretakers would have difficulty looking at these patients. It seems to suggest something about the limits on the imagination in terms of suffering. I’m wondering what it is about burns that makes it so hard to imagine the suffering they entail. Is it about the skin as the site of humanity? Is it about the face? ES: It is the visage. Without preparation and help, when we see the complete mutilation of the body, especially the face, we mistakenly feel we are seeing the mutilation of personhood. The ‘‘rule of nines’’ is devised to enable rescue workers to look at a gravely burned person and (instead of having their own minds shut down in sorrow and confusion and revulsion) to assess instantly the gravity of the injury, start appropriate treatment, and report the scale of the injury to the hospital awaiting the person’s arrival. Each part of the body is assigned an easy-to-remember number that is a multiple of nine (see fig. 5). Counting forms a key part in many forms of emergency rescue, and this is one instance. The numbers, once totaled, tell the rescuer the next step, such as whether to insert an IV for fluid resuscitation. The need to train the perceptions of those who hope to help those who are burned is also illustrated by a procedure called ‘‘staying.’’ During the years when I was part of a research group on suffering at the Hastings Center for Ethics, I heard a lecture by a physician-nurse who worked in a burn unit. She mentioned that because of the difficulty oflooking at a severely burned person, nurses assigned to burn units may begin to avert their eyes when speaking with a patient, decline to touch the patient, or stand at a greater distance each day, or request a transfer after a few days. To counteract these problems, caretakers can participate in a class on ‘‘staying’’ where they recognize the temptation to withdraw from the patient and practice trying to overcome that withdrawal. While the ‘‘rule of nines’’ and ‘‘staying’’ are brilliant inventions, we should recognize that in nuclear war there will be few rescue workers and nurses. A study in the Netherlands of what would happen if a terrorist brought into Rotterdam a very small 12 kg weapon (the size used in World War II) found that of those who had not immediately evaporated, four thousand persons would require burn beds.7 They noted that in all of the Netherlands there are only a hundred burn beds. A leading hospital in Boston, Mass General, has seven burn beds. The burn beds themselves—what few there are—will disappear in a nuclear strike. On the floor of the UK Parliament, the possession of four Trident submarines has repeatedly been justified by the potential need to bomb Moscow. In response, a Scottish study by John Ainslie looked at the scale of damage that would actually take place if a nuclear missile were launched against the Ministry of Defense building in Moscow: along with the Ministry of Defense, four major hospitals would be destroyed and four others subjected to fire and radiation that would make them inoperable. Thirty-one schools would also be destroyed with at least 700,000 children slain.8 If the missile is larger, so, too, will the disappearance of hospitals be larger. An article by Steven Starr, Lynn Eden, and Theodore A. Postol in the Bulletin of Atomic Scientists shows that if an 800-kiloton weapon were detonated above Manhattan, the center of the blast would be four times the temperature of the sun, and, within ‘‘tens of minutes,’’ a firestorm will cover 90 to 150 square miles. figure 5. Pocket card showing ‘‘Rule of Nines for Adult and Child,’’ Northwest Healthcare Response Network, https:// nwhrn.org/wp-content/ uploads/2018/08/BurnPocket-Card.pdf. An Interview with Elaine Scarry 123 RA: Was the artistic strategy that you just described of doubling the location so as to protect personhood apparent in the real-world examples you were citing, the Nagasaki children, the ‘‘rule of nines,’’ ‘‘staying’’? ES: I think so. It is not accidental that the Nagasaki Atomic Bomb Museum is itself physically beautiful in its architecture, or that as you enter you pass lavish cascades of paper cranes, inspired by the child Sadako Sasaki, like cherry blossoms in spring, or that you see an inscription about Nagasaki’s exceptional generosity to outsiders—its many centuries of open trade with foreign companies, a level of cosmopolitan hospitality not at that time found to the same degree in other regions of Japan; you see engraved inscriptions from Dwight D. Eisenhower and from the ‘‘United States Strategic Bombing Survey, Summary Report (Pacific War), July 1946’’ saying unequivocally that the atom bomb was not needed to end the war. All these elements, and many others, keep the personhood of the city’s inhabitants in view, side-by-side with the excruciating vision of burnt faces. The ‘‘rule of nines’’ lets one reconstruct the body out of a beneficent invention, toylike in its simplicity. In ‘‘staying,’’ the very name of the procedure holds the injury within the frame of sympathetic personhood. RA: Let’s return to Ghandi’s forking path. You’ve sketched the reasons why the US population is innocently sleeping. But what if they’re feigning sleep? ES: I am sometimes floored by the discrepancy between the attention we give to injuries that have happened when we can’t do anything to change them and the attention we give to injuries that haven’t yet happened when by intervention we absolutely can prevent them. I don’t know how to explain this. I have always assumed that those acts of trying to talk about the pain of torture victims in the 1970s in my case, or the pain of people in World War II, the Holocaust, that those acts are meant to act as a warning to the future. What is our motive for thinking about the unchangeable injuries of the past if not to increase our ability to prevent such injuries in the future? Yet almost incomprehensible is the distance between the willingness to think about events from the past we can’t possibly change and the complete comfort with feeling that future massacres need not concern us. Or worse, that one is slightly superior to protesting a wrong: intellectually superior because the moral wrong is an obvious moral wrong, and we only like to address sophisticated, hard to discern moral wrongs. It might be embarrassing to have to stand on a street corner with a sign or attend a public meeting. Imagine, though, if we forgave the complicity with past acts of enslavement or genocide by saying, ‘‘People saw that it was wrong, but they considered it too intellectually obvious, too compromising of their dignity, to have to stand up and protest.’’ Or take the argument that the aspiration to dismantle nuclear weapons is now many decades old, and we must turn to fresh undertakings: imagine that someone tried to defend those who tolerated slavery in 1860 because they had been hearing antislavery sentiment since 1820 and now considered such sentiments ‘‘stale.’’ We would never give a ‘‘pass’’ to anyone in the past who excused their inattention to slavery or the ~~transfer of people to concentration camps~~ on either of those two grounds; yet we believe such arguments release us from addressing weapons whose outcome is instant genocide. There are historical periods in which people were dissuaded from protesting because dissidents were beaten (Charles Sumner on the floor of the Senate) or killed (Dietrich Bonhoeffer in Germany). No such beatings or death threats excuse our own silence today. RA: Staying with this point about the relative ease of imagining pain past as opposed to pain in the future, do you attribute that to sentimentality? It sounds so reprehensible put in those terms. I wonder how you account for it. ES: I think you are right to worry that our attention to the past begins to look like sentimentality. The argument is sometimes made by academics that sympathy is less about compassion or the desire to ameliorate pain than it is a kind of cultural signaling of our moral goodness. To me that thesis seems horrifying: it lets the many who ignore past pain excuse their own inattention on the grounds that the few who do attend to pain are only doing so to announce their own goodness. So I feel a strong aversion to that argument; it works to reduce still further the number of those who show any wish to help. However, if it turns out that we only speak about irremediable injuries from the past while a huge architecture of massacre [is] ~~stands~~ waiting to be used, then one has to ask oneself: why were we looking at injuries in the distant past? Is it just sentimentality? Is it just cultural signaling?9(124-5)

## K — Honorable Harvest

#### Their alt author calls for political action to solve climate change as an enactment of the Honorable Harvest—

Kimmerer 20, enrolled member of the Citizen Potawatomi Nation and an American Distinguished Teaching Professor of Environmental and Forest Biology; and Director, Center for Native Peoples and the Environment, at the State University of New York College of Environmental Science and Forestry. (December 2020, Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge, and the Teachings of Plants Excerpts by Barbara Keating, https://uumankato.com/wp-content/uploads/2020/12/B-Keating-Braiding.Sweetgrass.Notes\_.pdf)

Maple Nation: A Citizenship Guide Page 169: Both of my parents have been active in their town government for years, so I’ve seen how stewardship of a community happens. “Good communities don’t make themselves,” my dad said. “We’ve got a lot to be grateful for, and we all have to do our part to keep it going.” Page 172: (Maple sap harvester) “Of course sugaring is a gamble every year. It’s not like you can control the sap flow. Some years are good and some aren’t. You take what you get and be grateful for it. It all depends on the temperature, and that’s out of our hands.” But that’s not entirely true anymore. Our addiction to fossil fuel and current energy policies accelerate carbon dioxide inputs every year, unequivocally causing a global rise in temperatures. Spring comes nearly a week earlier than it did just twenty years ago. Pages 173-4: Maples face a grave enemy. The most highly regarded models predict that the climate of New England will become hostile to sugar maples within fifty years.… Rising temperatures will reduce seedling success and regeneration will thereby start to fail. It is already failing. Insects will follow, and the oaks will get the upper hand. ¶ … maples will become climate refugees. To survive they must migrate northward to find homes at the boreal fringe. Our energy policy is forcing them to leave. They will be exiled from their homelands for the price of cheap gas. ¶ We do not pay at the pump for the cost of climate change, for the loss of ecosystem services provided by maples and others. Cheap gas now or maples for the next generation? ¶ … we get the government we deserve. … (Maples) deserve you and me speaking up on their behalf. To quote our town council woman, “Show up at the damn meeting.” Political action, civic engagement – these are powerful acts of reciprocity with the land.

#### --It attends to their beauty and their pain—the plan is an act of reciprocity

Steel 21, Reporter for Windspeaker.com. (Deb, Botanist reclaims Indigenous ways of knowing plants as persons and family, https://windspeaker.com/buffalo-spirit/botanist-reclaims-indigenous-ways-knowing-plants-persons-and-family)

This thinking persists today, but Kimmerer believes that the concept of plants as objects strips us of our responsibility to them. “They are just stuff.” But in Indigenous ways of knowing, plants are not viewed as the lowest, but as esteemed and respected persons. Kimmerer said she didn’t mean anthropomorphized versions of humans, but beings with their own gifts to share, their own intentions, sovereign and capable of charting their own pathways. Today, this way of knowing plants is on the cutting edge of contemporary plant science. Plants are the oldest of our teachers, Kimmerer said. “Let’s remember tonight as we go forward that one of the hallmarks of Indigenous ways of knowing is that we are blessed by being surrounded by intelligences other than our own,” she said. “In this year, which is the warmest ever recorded on the planet, and in this time when we have entered into the age of the sixth extinction… it is important to remember that we humans can’t innovate our ways out of this alone. It’s a good thing that we have our plant teachers.” Elder plants know everything needed to know about surviving into the future,” Kimmerer said. There is a lot they can teach us in this time of dramatic change and adaptation. Kimmerer joked that plants are not in endless meetings debating carbon tax structures, nor have they abandoned the Paris Accord. Plants have already converted completely to a solar economy, a model for human transformation. She talked of the lofty goal of entrepreneur Richard Branson’s Virgin Earth Challenge and its $25 million prize for someone to come up with a new technology that would take carbon dioxide out of the atmosphere, removing greenhouse gases. Kimmerer said there already is a system that does this. It’s takes carbon out of the atmosphere and emits oxygen, it purifies water, and builds soil. “Of course, that invention is the forest,” said Kimmerer. Science is starting to learn that plants can communicate, make choices, learn, strategize, and hear and respond to what they hear. They have their own stories, intentions and gifts. “Science is catching up to our traditional understanding of the personhood of plants,” she said. Plants are intrinsically valuable with gifts to share. They are more than objects, natural resources or things that can be turned into commodities. “I want to challenge my colleagues that work in departments of Natural Resources and ask them wouldn’t you rather teach in the department of Earthly Gifts.” The words we use really matter, Kimmerer said, like the word “sustainability”. Potawatomi Elders, upon hearing a number of definitions for the word sustainability said it sounded like a word that meant a way to keep on taking. It’s not right to keep on taking, they said. People should be thinking about what they have that they can give back. We should have mutually beneficial interactions, said Kimmerer. Those kinds of teachings are largely missing from schools on natural resources, she said. “So the question that really focuses us now is this one: In return for all of the gifts of the plants, how do we reciprocate? How do we give back?” Kimmerer said this was the most pressing question of our time. It’s the way the world actually works. “We know through ecosystem function that you can’t just take without replenishing. That’s not possible… Reciprocity among all the parts of the living world is what produces the conditions in which life can flourish.” Human beings seem to be the only species which pretends that such a necessity of function does not exist. Ancient wisdom tells us, said Kimmerer, that “the hallmark of an educated person is a person who knows what their gift is and how to give it in the world.” There are gifts that humans can offer in return for the wealth of gifts that plants have provided, including the act of paying attention, a unique human gift that can be given back to the plant world as an ongoing act of reciprocity. “Attention generates wonder which generates more attention and more joy which leads us to gratitude.” She said paying attention requires that we see not only the beauty, however, but also the pain, to celebrate the old growth and mourn the clearcut, to see the mountain and to see the mine. “Paying attention to the suffering in the world sharpens our ability to respond, to be responsible.” When you fall in love with the living world, you can’t be a bystander to its destruction, said Kimmerer.

#### Kimmerer advocates the perm—they endorse embracing indigenous knowledge and science and policy change to help preserve species

Kimmerer 2, enrolled member of the Citizen Potawatomi Nation and an American Distinguished Teaching Professor of Environmental and Forest Biology; and Director, Center for Native Peoples and the Environment, at the State University of New York College of Environmental Science and Forestry. (Robin, May 02, Weaving Traditional Ecological Knowledge into Biological Education: A Call to Action, <https://www.esf.edu/nativepeoples/documents/weaving.pdf>)

Recognition of traditional ecological knowledge increases opportunities for productive partnerships between Western scientists and indigenous people. Understanding of traditional knowledge can foster creative collaborations between indigenous and local peoples and tribal governments and Western environmental scientists, nongovernment organizations (Weber et al. 2000), policymakers, and natural resource managers. Many case histories document such cooperation, such as the biocultural restoration work of the Indigenous Peoples Restoration Network, the Intertribal Bison Cooperative, wolf restoration in Nez Perce territory (Robbins 1997), and Peoples Biodiversity Registers Program (Gadgil et al. 2000). Nabhan (2000) proposes partnerships with indigenous peoples to integrate their extensive knowledge bases for endangered species recovery efforts.

#### Indigenous activists are demanding that the federal government take actions to stop corporate exploitation of indigenous lands

Silverman 10/11/21, Reporter for Washington Post. (Ellie, Indigenous activists come to D.C. with a message for Biden: Declare a national climate emergency, https://www.washingtonpost.com/dc-md-va/2021/10/11/indigenous-protest-dc-climate-change/)

The 73-year-old — wearing a hat that said “Pipeline Fighter” — was among the leaders and members of Native American tribes from across the country who came to Washington for five days of protests that began Monday. The rallies are part of People vs. Fossil Fuels demonstrations by a coalition of groups known as Build Back Fossil Free, which is demanding that the Biden administration take more extreme actions to curb carbon-producing fossil fuel projects at a time when scientists say the world needs to sharply cut greenhouse gas emissions. The coalition’s name is a nod to President Biden’s “Build Back Better” agenda. “We are going to put our bodies on the line there. If we have to be arrested in order to call attention to what the crisis is and that we need a climate emergency declared, we’ll do that,” Camp-Horinek said. “There’s been 500 years of people coming into a territory where all things were interdependent and functioning to a time of crisis, where even Biden’s great-grandchildren won’t survive if something doesn’t change.” At times, tensions rose between protesters and police outside the White House, but the demonstration was largely peaceful. People sang, danced and prayed, holding signs that said, “Water is alive,” alongside cardboard cutouts of fish and birds on Pennsylvania Avenue. U.S. Park Police warned the demonstrators three times that they would risk being arrested if they did not disperse. Most of them moved into Lafayette Square, but about 156 remained, Sgt. Roselyn Norment, a U.S. Park Police spokesperson, said in a statement. Police escorted those protesters to a nearby tent. They were issued citations for obstructing traffic and then released, Norment wrote. About 40 minutes after protesters were told to move away from Pennsylvania Avenue, Secret Service officers converged on Erica Jones, 41, an enrolled member of the Crow Creek Sioux Tribe who lives in Ramsey, Minn., as she cried out for help. They handcuffed her, and she fell to the ground, crying that she was a mother and didn’t want to die. Shortly after, police released her on the sidewalk, and she cried on the shoulder of another protester. Jones said in an interview that she had thrown an orange toward police and believes that prompted the police action. Secret Service did not immediately respond to a request for comment. Protesters also pushed against metal fences and yelled at the Park Police and Secret Service officers across from them. “Didn’t y’all just have an insurrection?” one protester yelled over a megaphone, referencing the Jan. 6 riot at the Capitol and criticizing the police presence on Monday. However, most of the demonstration centered on Indigenous leaders, who say they’ve been ignored for too long. They argue that they have been effective stewards and protectors of the land — preserving biodiversity and leading the front-line fights against pipelines and drilling around their reservations — but that they are still forced to experience the devastating effects of the Earth’s warming up close. This week, they’re demanding that Biden stop approving fossil fuel projects and declare a national climate emergency. As a child, Camp-Horinek remembers how Ponca Nation members were able to grow their own food, hunt and fish to provide for their families. But they can’t do that anymore, she said. The soil is too polluted to grow anything organic, fish are dying, and animals have cancers and growths that make them unsafe to eat, she said. They have to buy purified water from the nearest city. “Everything has changed,” Camp-Horinek said. “I hope to accomplish a way forward for my children and grandchildren and great-grandchildren to be able to breathe, to eat and to drink, and to leave a legacy that says at this crucial moment in time, the Indigenous people, including their grandma, great-grandma and mama, was there to raise a voice of reason.” An ancient people with a modern climate plan ‘Put us first’ Organizers of the People vs. Fossil Fuels demonstrations planned their week of climate protests to start on Indigenous Peoples’ Day, as many activists and localities have rebranded Columbus Day, to recognize the work of Indigenous people fighting fossil fuel extraction across the country. They said Indigenous activists bring generational knowledge of the battles against pipelines and drilling around reservations and a deep understanding of the land that can pave a path forward in tackling climate change. Organizers said they expect thousands of people to show up in Washington throughout the week. On a permit application submitted to the National Park Service, organizers estimated about 300 attendees a day. Environmental justice activists are frustrated by what they say is a lack of action from the Biden administration to deliver on climate-related campaign promises. They bring up the recent landmark report from the United Nations Intergovernmental Panel on Climate Change as proof of the urgency needed to implement sweeping measures to slow the pace of emissions. The planet is on track to warm more than 2 degrees Celsius above preindustrial levels, which could trigger irreversible damage and more deadly climate crises such as fires, heat waves and floods.

#### Even if tech’s dangerous, it’s the only thing that stops massive die offs — plus it maximizes value to life.

Haeberlin, 4 – nuclear engineer, led the Nuclear Safety and Technology Applications Product Line at the Pacific Northwest National Laboratory (Scott, A Case for Nuclear-Generated Electricity, p. 31-40)

Well, then let's not do that, huh? Well, no, not hardly, because without that use of fertilizers we couldn't produce the food to feed the population. We just couldn't do it. Here are some comparisons."

If you used no fertilizers or pesticides you could get 500 kilograms of grain from a hectare in a dry climate and as much as 1000 kilograms in a humid cli­mate. If you got organic and used animal manure as fertilizer, assuming you could find enough, you might get as much as 2000 kilograms per hectare. For a sense of scale, the average in the United States, where recall we only get half the food value to hectare as the intensively farmed Chinese crop land, we get about 4500 kilograms per hectare on the average. In serious cornfields with fertilizer, irrigation, and pesticides, the value is 7000 kilograms per hectare.

Modern mechanized, chemically supported agriculture produces 7 to 14 times the food that you would get without those advantages. Even the best organic farming would produce only 30 to 45% of the food value you would get from the same sized chemically fertilized farm, and that is assuming you could get the manure you needed to make it work.

In very stark terms, without the chemically enhanced farming we would have probably something like one-fifth the food supply we have now. That means four-fifths the population would not be fed, at least as we are organized now. So, no, just giving up on fertilizers is not in the deal.

However, we could get the hydrogen and energy from sources other than natural gas. Nuclear energy could be used to provide electricity to extract hydrogen from water and produce the process heat required to combine the hydrogen and nitrogen from the air. That is just a thought to stick in your mind. While we are looking at energy use in agriculture, here are a few more numbers for you.10 If you look at the energy input into agriculture and the energy you get out, you see some interesting facts. By combining the energy used to make fertilizers and pesticides, power irrigation, and run the farm machinery in the United States, we use about 0.7 kcal of fossil fuel energy for each 1 kcal of food we make. This doesn't include the energy needed to process and transport the food. In Europe where they farm more intensely, the amount of energy out is just about the same as energy in. In Germany and Italy the numbers are 1.4 and 1.7 kcal energy input to each 1 kcal output respectively. The point is you need energy to feed people, well at least a lot of people.

Which gets us back to Cohen and his question. One of the studies he examined looked at a "self-sustaining solar energy system." For the United States, this would replace all fossil energy and provide one-fifth to one-half the current energy use. The conclusion of the study was that this would either produce" a significant reduction in our standard of living ... even if all the energy conservation measures known today were adopted" or if set at the current standard of living, "then the ideal U.S. population should be targeted at 40-100 million people." The authors of that study then cheerfully go on to point out that we do have enough fossil fuel to last a least a century, as long as we can work out the pesky environmental problems. So, you can go to a "self-sustaining" energy economy as long as you are willing to shoot between 2 out of 3 and 6 out of 7 of your neighbors.

And this is a real question. The massive use of fossil fuel driven agriculture to provide the fertilizers and pesticides, and power the farm equipment, is a) vitally important to feed everyone, and b) something we just can't keep up in a business-as-usual fashion. Sustainable means you can keep doing it. Fossil energy supplies are finite; you will run out some time. Massive use of fossil energy and the greenhouse gases they produce also may very well tip the planet into one of those extinction events in which a lot of very bad things happen to a lot of the life on the earth.

O.K. to Cohen's big question, how many people can the earth support? What it comes down to is that the "Well, it depends" answer depends on

• what quality of life you will accept,

• what level of technology you will use, and

• what level of social integration you will accept.

We have seen some of the numbers regarding quality of life. Clearly if you are willing to accept the Bangladesh diet, you can feed 1.8 times more people than if you chose the United States diet.

If you choose the back-to-nature, live like our hearty forefathers, level of technology, you can feed perhaps one-fifth as many people as you can with modern chemical fertilized agriculture. The rest have to go.

And here is the tough one. You can do a lot better, get a lot more people on the planet, if you just force a few things. Like, no more land wasted in growing grapes for wine or grains for whiskey and beer. No cropland used for tobacco. No more grain wasted on animals for meat, just grain for people. No more rich diets for the rich countries, share equally for everyone. No more trade barriers; too bad for the farmers in Japan and France, those countries would just have to accept their dependence on other countries for their food. It is easy to see that at least some of those might actually be a pretty good thing; however, the kicker is how do you get them to happen? After all, Mussolinill did make the trains run on time. How could you force these things without a totalitarian state? Are you willing to give up your ability to choose for yourself for the common good? It is not pretty, is it?

Cohen looked at all the various population estimates and concluded that most fell into the range of 4 to 16 billion. Taking the highest value when researchers offered a range, Cohen calculated a high median of 12 billion and taking the lower part of the range a low median of 7.7 billion. The good news in this is 12 billion is twice as many people as we have now. The bad news is that the projections for world population for 2050 are between 7.8 and 12.5 billion. That means we have got no more than 50 years before we exceed the nominal carrying capacity of the earth. Cohen also offers a qualifying observation by stating the "First Law of Information," which asserts that 97.6% of all statistics are made up. This helps us appreciate that application of these numbers to real life is subject to a lot of assumptions and insufficiencies in our understanding of the processes and data.

However, we can draw some insights from all of this. What it comes down to is that if you choose the fully sustainable, non-fossil fuel long-term options with only limited social integration, the various estimates Cohen looked at give you a number like 1 billion or less people that the earth can support. That means 5 out of 6 of us have got to go, plus no new babies without an offsetting death.

On the other hand, if you let technology continue to do its thing and perhaps get even better, the picture need not be so bleak. We haven't made all our farmland as productive as it can be. Remember, the Chinese get twice the food value per hectare as we do in the United States. There is also a lot of land that would become arable if we could get water to it. And, of course, in case you need to go back and check the title of this book, there are alternatives to fossil fuels to provide the energy to power that technology.

So given a positive and perhaps optimistic view of technology, we can look to some of the high technology assumption based studies from Cohen's review. From the semi-credible set of these, we can find estimates from 19 to 157 billion as the number of people the earth could support with a rough average coming in about 60 billion. This is a good time to be reminded of the First Law of Information. The middle to lower end of this range, however, might be done without wholesale social reprogramming. Hopefully we would see the improvement in the quality of life in the developing countries as they industrialize and increase their use of energy. Hopefully, also this would lead to a matching of the reduction in fertility rates that has been observed in the developed countries, which in turn would lead to an eventual balancing of the human population.

The point to all this is the near-term future of the human race depends on technology. If we turn away from technology, a very large fraction of the current and future human race will starve. If we just keep on as we are, with our current level of technology and dependence on fossil fuel resources, in the near term it will be a race between fertility decrease and our ability to feed ourselves, with, frankly, disaster the slight odds-on bet. In a slightly longer term, dependence on fossil fuels has got to lead to either social chaos or environmental disaster. There are no other end points to that road. It doesn't go anywhere else.

However, if we accept that it is technology that makes us human, that technology uniquely identifies us as the only animal that can choose its future, we can choose to live, choose to make it a better world for everyone and all life. This means more and better technology. It means more efficient technology that is kinder to the planet but also allows humans to support large numbers in a high quality of life. That road is not easy and has a number of ways to screw up. However, it is a road that can lead to a happier place, a better place.

Two Concluding Thoughts on the Case for Technology

Two more points and I will end my defense of technology. First, I want to bring you back from all the historical tour and all the numbers about population to something more directly personal. Let me ask you two questions.

What do you do for a living?

What did you have for breakfast?

Don't see any connection between these questions or of their connection to·the subject of technology? Don't worry, the point will come out shortly. I am just trying to bring the idea of technology back from this grand vision to its impact on your daily life.

Just as a wild guess, your answer to the first question was something that, say 500 years ago, didn't even exist. If we look 20,000 years ago, the only job was" get food." Even if you have a really directly socially valuable job like a medical doctor, 20,000 years ago you would have been extraneous. That is, the tribe couldn't afford you. What, no way! A doctor could save lives, surely a tribe would value such a skill. Well, sure, but the tribe could not afford taking one of their members out of the productive */I* getting the food" job for 20 years while that individual learned all those doctor skills.

If you examine the "what you do for a living" just a bit I think you will see a grand interconnectedness of all things. I personally find it pretty remarkable that we have a society that values nuclear engineers enough that I can make a living at it. Think about it. Somehow what I have done has been of enough value that, through various taxpayer and utility ratepayers, society has given me enough money for food and shelter. The tribe 20,000 years ago wouldn't have put up with me for a day.

You see, that is why we as humans are successful, wildly successful in fact. We work together. "Yeah, sure we do," you reply, " read a newspaper lately?" Well, *O.K.,* we fuss and fight a good deal and some of us do some pretty stupid and pretty mean things. But the degree of cooperation is amazing if you just step back a bit.

O.K., what did you have for breakfast: orange juice, coffee, toast, maybe some cereal and milk? Where do these things come from? Orange juice came from Florida or California. Coffee came from South America. Bread for the toast came perhaps from Kansas; cereal, from the Mid-West somewhere. The jam on the toast may have come from Oregon, or maybe Chile. Milk is probably the only thing that came from within a hundred miles of your breakfast table. Think about it. There were hundreds of people involved in your breakfast. Farmers, food-processing workers, packaging manufacturers, transportation people, energy producers, wholesale and retail people. Perhaps each one only spent a second on their personal contribution to your personal breakfast, but they touch thousands of other people's breakfasts as well. In turn, you buying the various components of your breakfast supported, in your part, all those people. They in turn, in some way or another, bought whatever you provide to society that allowed you to buy breakfast. Pretty amazing, don't you think?

Now when you look at all that, think about what ties all the planetwide interconnection, Yep, you guessed it: technology. Without technology, you get what is available within your personal reach, and what you produce is available only to those who are near enough that you can personally carry it to them on your own two feet. Technology makes our world work. It gives you personally a productive and socially valuable way to make both a living and to provide your contribution to the rest of us**.**

I want you to stop a minute and really think about that. What would your life be like without technology? Could you do what you currently do? Would anyone be able to use what you do? Would anyone pay you for that? "But I am a school teacher," you say, "of course, they would pay me!" Are you sure? Why do you need schools if there is no technology? All I need is to teach the kid how to farm and how to hunt. Sons and daughters can learn that by working in the fields along with their parents. See what I mean?

Now, I have hopefully reset your brain. Sure, you are still going to be hit with daily "technology is bad" messages. Hopefully, you are a bit more shielded against that din, and you have been given some perspective to balance that message and are prepared to see the true critical value of technology to human existence. The point is that technology is what makes us human. Without it, we are just slightly smarter monkeys.

You may feel that 6 billion of us are too many, and that may very well be. I personally don't know how to make that value decision. Which particular person does one select as being one of the excess ones?

However, the fact is that there are 6 billion of us, and it looks like we are headed for 10 to 12 billion in the next 50 years, Without not only the technology we have, but significantly better and more environmentally friendly technology, the world is going to get ugly as we approach these numbers,

On the other hand, with the right technologies we can not only support those numbers, we can do it while we close the gap between the haves and have-nots. We can make it a better place for everyone. It takes technology and the energy to drive it. Choosing technology is what we have to do to secure the evolutionary selection of us as a successful species, Remember, some pages back in discussing the unlikely evolutionary path to us, I said we are not the chosen, unless. Unless we choose us. This is what I meant. We are totally unique in all of evolutionary history. We humans have the unique ability and opportunity to choose either our evolutionary success or failure. A choice of technology gives us a chance. A choice rejecting technology dooms us as a species and gives the cockroaches the chance in our place. Nature doesn't care what survives, algae seas, dinosaurs, humans, cockroaches, or whatever is successful. If we care, we have to choose correctly.

As an aside, let me address a point of philosophy here. If any of this offends your personal theology, I offer this for your consideration. Genesis tells us God gave all the Earth to humanity and charged us with the stewardship thereof. So it is ours to use as well as we can. That insightful social philosopher Niccolo Machiavelli put it this way in 1501:

"What remains to be done must be done by you; since in order not to deprive us of our free will and such share of glory as belongs to us, God will not do everything Himself."

*O.K.,* you are saying, "I give." You have beaten the socks off me. Technology is good; technology is the identifying human trait and our only hope. But what is this stuff about choosing technology or not? Technology just happens doesn't it? I mean, technology always advances, it always has, so why the big deal?

#### Technological innovation successfully dematerializes growth and solves warming

McAfee 19, \*Andrew Paul McAfee, a principal research scientist at MIT, is cofounder and codirector of the MIT Initiative on the Digital Economy at the MIT Sloan School of Management; (2019, “More from Less: The Surprising Story of How We Learned to Prosper Using Fewer Resources and What Happens Next”, https://b-ok.cc/book/5327561/8acdbe)

There is no shortage of examples of dematerialization. I chose the ones in this chapter because they illustrate a set of fundamental principles at the intersection of business, economics, innovation, and our impact on our planet. They are:

We do want more all the time, but not more resources. Alfred Marshall was right, but William Jevons was wrong. Our wants and desires keep growing, evidently without end, and therefore so do our economies. But our use of the earth’s resources does not. We do want more beverage options, but we don’t want to keep using more aluminum in drink cans. We want to communicate and compute and listen to music, but we don’t want an arsenal of gadgets; we’re happy with a single smartphone. As our population increases, we want more food, but we don’t have any desire to consume more fertilizer or use more land for crops.

Jevons was correct at the time he wrote that total British demand for coal was increasing even though steam engines were becoming much more efficient. He was right, in other words, that the price elasticity of demand for coal-supplied power was greater than one in the 1860s. But he was wrong to conclude that this would be permanent. Elasticities of demand can change over time for several reasons, the most fundamental of which is technological change. Coal provides a clear example of this. When fracking made natural gas much cheaper, total demand for coal in the United States went down even though its price decreased.

With the help of innovation and new technologies, economic growth in America and other rich countries—growth in all of the wants and needs that we spend money on—has become decoupled from resource consumption. This is a recent development and a profound one.

Materials cost money that companies locked in competition would rather not spend. The root of Jevons’s mistake is simple and boring: resources cost money. He realized this, of course. What he didn’t sufficiently realize was how strong the incentive is for a company in a contested market to reduce its spending on resources (or anything else) and so eke out a bit more profit. After all, a penny saved is a penny earned.

Monopolists can just pass costs on to their customers, but companies with a lot of competitors can’t. So American farmers who battle with each other (and increasingly with tough rivals in other countries) are eager to cut their spending on land, water, and fertilizer. Beer and soda companies want to minimize their aluminum purchases. Producers of magnets and high-tech gear run away from REE as soon as prices start to spike. In the United States, the 1980 Staggers Act removed government subsidies for freight-hauling railroads, forcing them into competition and cost cutting and making them all the more eager to not have expensive railcars sit idle. Again and again, we see that competition spurs dematerialization.

There are multiple paths to dematerialization. As profit-hungry companies seek to use fewer resources, they can go down four main paths. First, they can simply find ways to use less of a given material. This is what happened as beverage companies and the companies that supply them with cans teamed up to use less aluminum. It’s also the story with American farmers, who keep getting bigger harvests while using less land, water, and fertilizer. Magnet makers found ways to use fewer rare earth metals when it looked as if China might cut off their supply.

Second, it often becomes possible to substitute one resource for another. Total US coal consumption started to decrease after 2007 because fracking made natural gas more attractive to electricity generators. If nuclear power becomes more popular in the United States (a topic we’ll take up in chapter 15), we could use both less coal and less gas and generate our electricity from a small amount of material indeed. A kilogram of uranium-235 fuel contains approximately 2–3 million times as much energy as the same mass of coal or oil. According to one estimate, the total amount of energy that humans consume each year could be supplied by just seven thousand tons of uranium fuel.

Third, companies can use fewer molecules overall by making better use of the materials they already own. Improving CNW’s railcar utilization from 5 percent to 10 percent would mean that the company could cut its stock of these thirty-ton behemoths in half. Companies that own expensive physical assets tend to be fanatics about getting as much use as possible out of them, for clear and compelling financial reasons. For example, the world’s commercial airlines have improved their load factors—essentially the percentage of seats occupied on flights—from 56 percent in 1971 to more than 81 percent in 2018.

Finally, some materials get replaced by nothing at all. When a telephone, camcorder, and tape recorder are separate devices, three total microphones are needed. When they all collapse into a smartphone, only one microphone is necessary. That smartphone also uses no audiotapes, videotapes, compact discs, or camera film. The iPhone and its descendants are among the world champions of dematerialization. They use vastly less metal, plastic, glass, and silicon than did the devices they have replaced and don’t need media such as paper, discs, tape, or film.

If we use more renewable energy, we’ll be replacing coal, gas, oil, and uranium with photons from the sun (solar power) and the movement of air (wind power) and water (hydroelectric power) on the earth. All three of these types of power are also among dematerialization’s champions, since they use up essentially no resources once they’re up and running.

I call these four paths to dematerialization slim, swap, optimize, and evaporate. They’re not mutually exclusive. Companies can and do pursue all four at the same time, and all four are going on all the time in ways both obvious and subtle.

Innovation is hard to foresee. Neither the fracking revolution nor the world-changing impact of the iPhone’s introduction were well understood in advance. Both continued to be underestimated even after they occurred. The iPhone was introduced in June of 2007, with no shortage of fanfare from Apple and Steve Jobs. Yet several months later the cover of Forbes was still asking if anyone could catch Nokia.

Innovation is not steady and predictable like the orbit of the Moon or the accumulation of interest on a certificate of deposit. It’s instead inherently jumpy, uneven, and random. It’s also combinatorial, as Erik Brynjolfsson and I discussed in our book The Second Machine Age. Most new technologies and other innovations, we argued, are combinations or recombinations of preexisting elements.

The iPhone was “just” a cellular telephone plus a bunch of sensors plus a touch screen plus an operating system and population of programs, or apps. All these elements had been around for a while before 2007. It took the vision of Steve Jobs to see what they could become when combined. Fracking was the combination of multiple abilities: to “see” where hydrocarbons were to be found in rock formations deep underground; to pump down pressurized liquid to fracture the rock; to pump up the oil and gas once they were released by the fracturing; and so on. Again, none of these was new. Their effective combination was what changed the world’s energy situation.

Erik and I described the set of innovations and technologies available at any time as building blocks that ingenious people could combine and recombine into useful new configurations. These new configurations then serve as more blocks that later innovators can use. Combinatorial innovation is exciting because it’s unpredictable. It’s not easy to foresee when or where powerful new combinations are going to appear, or who’s going to come up with them. But as the number of both building blocks and innovators increases, we should have confidence that more breakthroughs such as fracking and smartphones are ahead. Innovation is highly decentralized and largely uncoordinated, occurring as the result of interactions among complex and interlocking social, technological, and economic systems. So it’s going to keep surprising us.

As the Second Machine Age progresses, dematerialization accelerates. Erik and I coined the phrase Second Machine Age to draw a contrast with the Industrial Era, which as we’ve seen transformed the planet by allowing us to overcome the limitations of muscle power. Our current time of great progress with all things related to computing is allowing us to overcome the limitations of our mental power and is transformative in a different way: it’s allowing us to reverse the Industrial Era’s bad habit of taking more and more from the earth every year.

#### 1---Ballantyne votes for the permutation.

their author, Ballantyne 14 – Dechinta Bush U, Dechinta Bush University: Mobilizing a knowledge economy of reciprocity, resurgence and decolonization [Erin Freeland; *Decolonization: Indigeneity, Education & Society* Vol. 3, No. 3; 2014; pg 67-85]

At the crux of this decolonization and anti-capitalism process, is the ongoing tension that in order to access the bush we are now dependent on ski-doo, bush planes and rifles that require us to participate in capitalist economies to acquire. This signals a necessary involvement and tension with capitalism. With this tension clearly in our sights, Dechinta exists at the edge of flexibility. We borrow tools that are useful from academic institutions, and leave those which do not serve our mandate. We are making new tools and using them in new ways, breathing into spaces which did not exist before, breathing into spaces that have not been nurtured for too long. At this time, Dechinta exists and operates within the spheres of settler capitalism, realigning, repurposing and reasserting capital to get in the way of and to disrupt settler colonization. We are not just getting in between settlers and their money (Coulthard, 2014a), we are taking settler money and reorganizing the purpose and distribution of capital to disrupt its flow. The new circulations are part of processes, a dance to build up force, to accumulate power in transformed articulations resulting in different expressions. Investment of capital through Dechinta perverts capitalism. In Massumi’s (1992) eloquent dissection, “Capitalism infinitizes a body’s debt to society: all but the richest must slave away being “productive members of society,” everyone must “pay back her debt to society”, day in and day out, or starve. The unequal equivalence that is set up operates on a continual basis rather than punctually (rites of passage) or serially (punishments for particular crimes): it is institutionalized as the everyday equation between habitual suffering and regular paychecks (work)” (p. 189). In this way, the abstract machine of capitalism both encodes and operationalizes the original sin the priests so aptly prepared us for. The mission of transformation of souls by the Church was simply a precursor strategy to prepare the colonized body for the infection of capital. In Denendeh (and certainly elsewhere) The State-Church strategy was thus: children forcibly removed from families on the land into schools. Parents where gifted the option to come live ‘for free’ near the schools in settlements (where you could see your child through the fence). Upon arrival, bills for both rent and heating fuel quickly arrived, thus trapping families in the indentured servitude of debt (Asch, 1977). The small game around settlements quickly disappeared, as did the reciprocal wealth of land-based harvesting and sharing, as men were poached by petro-capitalists, offering easy access to cash (to pay debts), another ‘gift’ offered by the settler to the Indigenous body politic in a syphillic cloak of Christian duty. This loan-debt power relation exemplifies an important transition from spaces of enclosure to Deleuze’s societies of control, where ‘man is no longer man enclosed but man in debt’ (1992, p. 6). Thus, networks of support (are) mutated(ing) from family to commercial insurance. We no longer owe our souls to the church for salvation - we owe our life’s work to the bank, and somewhere along the line freedom, health and well-being have become inextricably linked with profit (or at minimum, access to short-term cash deepening debt).

Thus, when we speak of resistance to settler capitalism we then must speak about how to remove bodies from both enclosure and debt. Operating within capitalism while simultaneously articulating anti-colonial and decolonization goals is a given, but we must also imagine how we push back the enclosures of capital to take back places and spaces, both materially and beyond. This mission is critical given the growing numbers of Indigenous partnerships with industry, particularly in extractive-resource mineral rich territories like Denendeh. These relationships signal that both settler capitalism and Indigenous self-determination can exist copasetically. Indeed many First Nations articulate the Helinian ideal that emancipation from colonization will come through the freedoms promised by capital gain, that somehow magically, through the attainment of wealth, the fundamental inequalities of settler colonialism dissipate (even if just from view, onto another Nation’s territory).

#### 2---Ballantyne is basically an advertisement for Dechinta Bush University, which is an interesting program for field research, but woefully inadequate to challenge structural settler colonialism---Ballantyne’s hunting example is rhetorically patriarchal.

their author, Ballantyne 14 – Dechinta Bush U, Dechinta Bush University: Mobilizing a knowledge economy of reciprocity, resurgence and decolonization [Erin Freeland; *Decolonization: Indigeneity, Education & Society* Vol. 3, No. 3; 2014; pg 67-85]

For example, hunting is herein a complex example of theory-to-practice. It has been articulated that decolonizing the diet is a worthy endeavour, and everyone agrees that bush food is better than industrial meat and that hunting is a worthy practice. Hunting, as it moves from a statement to practice becomes complex. To ‘go hunting’ requires the collaborative knowledge of generations who have signalled where moose like to be in specific times of year, how they move, and how they are impacted by snow or water conditions and temperature. At Dechinta, factors like Elders’ guidance and knowledge (both direct and passed on), climate change (this winter the snow is heavier and wetter than ever before, willows are in deeper snow for food access), the nearby invasion of a rare-earth metal exploration (the moose does not like being near the cut lines or the exploration road, nor the sound of the drill), factor into our deliberations about the hunt. Who will go on the hunt (a small group for fast mobility, no women on their moon time, etc.), what we need to bring with us (tarps, small axes, knives, rifle, etc) are group conversations, which actively teach self-governance. These deliberations are woven with reflections of books and readings but give real context and place to the academic work. Groups comprised of different Indigenous nations and settlers, Elders and children, bring forward new considerations and difficult questions which are worked through in never ending cycles – getting deeper and deeper.

While divided into separate courses to meet university requirements, as a whole the curriculum is designed to open spaces to think and be radically sustainable, healthy and selfdetermining. Collaborative teaching between Elder professors, university professors, leaders and community experts is fundamental, as is our KidsU program so that families remain central to intergenerational learning on-site. Establishing practices of governance though daily governance circles establishes values through Dene Law, as well as the shared traditions of the students present and their respective traditions and Nations. Though the process of establishing governance, many of the core challenges of self-determination are encountered. Coming from a colonized framework, there is often struggle over dependence and reliance on the program facilitators - what is their role, what is their inherent power and how can these be made more horizontal and shifted through processes of self-governing? The disruption of daily activities usually circumscribed into the practice of capitalism - such as the exchange of money - is at first jarring, then celebrated. The lack of a cash economy and ability to purchase can be both uncomfortable and strange. There is much discussion around how desires are tied to the ability to purchase, or feelings of worth and engagement linked to buying.

The process of Dechinta is intensive, with up to 8 weeks spent in the bush with a small, intergenerational group doing very hard physical, mental and spiritual work, day in day out. Through this process, one of the most common feelings encountered, alongside rage and peace, is guilt. It is the guilt of having been raised in small communities and not having the land-based skills by which so many thinkers ground Indigeneity and Indigenous-ness. Some students have never actually lit a fire, let alone spent significant time in the bush. While many are raised in sedentary communities located in heart of their motherlands, they do not have access to land. Deterritorialization has been so effective that kids can grow up in Denendeh having never practiced skills which two generations ago would have been fundamental to survival. The colonial apparatus has been this effective in removing people from their land while leaving them physically on it. During the process of Dechinta, many bush skills are learned with Elders who share the collective knowledge of what has been remembered. Learning these practices evokes the anger of never having been taught, as well as provokes exploring why those teachings where severed and how learning them revitalizes and rekindles. These skills are complex in their meaning and application. They always involve reaching back to the teaching of ancestors to share what was learned, where, and from whom. Thus, bush pedagogy is always rooted in place and in relationships and stories. Through the learning of skills, what is experienced is a shift from guilt to gift. This is what has been called ‘the Dechinta Transformation’ (Sterriah, 2014), whereby the forces of Indigenous theory and practice merge and result in students who can articulate processes of decolonization on paper as well as engage in decolonization through an active process of becoming rooted in land based practices. This space of exchange is critical, especially given the increasingly popular and problematic call to ‘decolonize’ and ‘indigenize’ the academy. As Dechinta students receive credit in Native Studies courses from the University of Alberta, it is important to give pause to the role universities play in decolonization, and how we can manipulate the university as an idea to recentralize the land in learning.