

# Ports of the Future

A Vision for Secure, Collaborative, and Technology Enabled Border  
Management

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## Executive Summary

U.S. Customs and Border Protection (CBP) was created in the wake of the terrorist attacks of 9/11, with a mandate to enhance security without disrupting international trade and travel. Over the last twenty-one years, CBP has responded to this mandate in a sophisticated, effective way: requiring advanced information on shipments and people bound for the United States, deploying automated targeting systems, helping to develop and apply watchlists for dangerous individuals, creating vetted traveler and shipper programs, devising additional partnerships with the private sector (e.g., the Air Cargo Advanced Screening program, or ACAS), expanding preclearance for both air passengers and cargo, scanning 100% of inbound containers for radiation, establishing information-sharing regimes with trusted foreign partners, and pushing new customs standards around the world. Collectively, these achievements constitute a revolution in border management. Rather than focusing on a particular *line* – the physical border – CBP has exploited its authorities to document and secure *flows* of goods and people. As a result, a great deal of screening, inspection, revenue collection, and other customs and immigration functions are done now either before or after entry into the United States, rather than at congested crossing points. The resulting system remains a signal achievement in American public administration.

At the same time, CBP now confronts a different world that will require a new approach to key aspects of border management. To begin with, the national security context in which CBP operates has changed. Although the specific threat from organizations like Al Qaeda and ISIS has diminished significantly, terrorism has not disappeared; meanwhile, state-sponsored threats (often focused on disruption rather than mass casualty events), counterintelligence, counter-proliferation (CP), and transnational organized crime (TOC) have become increasingly salient concerns.

Economic globalization has changed as dramatically as the national security picture. Crucial shifts include the freer use of tariffs, the growing salience of trade-related violations (known outside CBP as environmental-social-governance, or ESG, concerns), the challenge of ensuring that manifest data are accurate, and the proliferation of small shipments fueled by e-commerce. Many of these changes are intertwined with the rise of China, now America's largest trading partner but also a geostrategic rival with whom collaboration on security issues remains challenging. Another signal development was the COVID-19 pandemic, which led to major disruptions in supply chains and shut down international travel. Whether CBP and its partners are prepared for the next such crisis remains an open question.

Finally, technological innovation has opened up opportunities for radical changes in border management. Particularly important are (1) facial comparison; (2) non-intrusive scanning; (3) digitalization, geolocation, and the consequent availability of Big Data; and (4) advances in artificial intelligence (AI) that enable better targeting and anomaly detection. It is now much easier to imagine seamless international air travel, the automation of many border-related functions, and much higher inspection rates for cargo than it was at CBP's creation.

This Report offers a new vision for “ports of entry of the future” that responds to these novel challenges and opportunities. In the cargo domain, this vision consists of:

1. Full visibility by CBP into firms' foreign supply chains, with appropriate mechanisms to ensure that the information CBP receives is accurate and sufficiently descriptive;
2. A more sophisticated, automated targeting apparatus based on reliable data;

3. Greatly expanded non-intrusive inspection (NII) of shipments, across all modes;
4. The creation of trusted networks of producers, terminal operators, and shippers that deliver greater security, reliability, and resilience throughout the GSS;
5. With White House support, efforts to harmonize data requirements and customs authorities in order to achieve a true “processed once” regime within North America; and
6. A renewed, CBP-led bilateral and multilateral effort to build global support for the above goals.

Because these goals may require a decade or longer to implement, CBP will need to articulate intermediate steps. For instance, increasing visibility into firms’ supply chains should begin with sectors where (a) violations of trade regulations are common, (b) there is domestic private sector support for enforcement and (c) new data requirements will have the least adverse effect on small business. Implementation must also take into account the idiosyncrasies of different modes (mail, express consignment, air cargo, rail, trucks, maritime, etc.). For instance, in the case of maritime containerized cargo, NII inspection should increase gradually from approximately 1% to 10-15% over the next five years, focusing on shipments that are not part of trusted networks.

With regard to people, the goal should be near-seamless, end-to-end travel, beginning with the air environment, that permits travelers to move through the system without multiple interruptions or queues. This approach entails:

1. A secure electronic passport allowing for touchless, paperless, automated identity verification;
2. Full deployment of facial comparison systems;
3. More extensive advanced and real-time information as travelers move through the system, and the ability to fuse this data rapidly for the purpose of risk assessment and adjudication;
4. Biometric entry and exit, including a processed once regime with trusted partners;
5. A new partnership with the public on privacy, premised on CBP’s ability to protect personal data and to communicate transparently about its operations; and
6. A well-crafted approach to pandemics, emphasizing risk mitigation based on passenger origin and exploiting (voluntarily provided) health information, rather than closing borders.

As in the cargo domain, implementation must be phased and attentive to differences across modes. For instance, many elements of seamless travel will inevitably proceed more rapidly in some modes (e.g., international air travel) than in others (e.g., pedestrians and passenger vehicles on the southwest border). Likewise, vetted traveler programs will continue to play an important role for the next five to ten years, before a new system of seamless travel renders them obsolete.

A good deal of progress toward this overall vision can be achieved by deepening CBP’s approaches to date: expansion of data holdings, more sophisticated targeting, digitalization and automation of operations, and broader deployment of NII. However, realizing the Borders of the Future will also require new types of data (e.g., on supply chains and travelers’ locations), new authorities (especially in terms of collecting data and penalizing non-compliant firms), and new collaborations (especially with The Trade and trusted foreign actors). The Borders of the Future also depend upon a “CBP of the Future”. The new vision laid out here has important implications for how CBP should structure partnerships with the private sector, prioritize engagements with foreign governments, allocate resources, align investments in technology and systems, rethink the physical footprint of POEs, staff the agency, and organize itself internally. Ultimately, CBP should be the architect and executor – in partnership with The Trade, other U.S. agencies, and foreign countries – of a secure, efficient, transparent, and predictable border management regime for the next era of globalization.

## Objectives, scope, and roadmap

### THE PROJECT

This Report is based on more than two years of research into POE operations (see “[Original project proposal and workplan](#)”) by five analysts with extensive backgrounds in customs and immigration issues (see “[About the authors](#)”). The research itself included dozens of interviews with a range of people involved with border management and the GSS: current and former U.S. government officials, current and former officials of foreign governments, domestic and foreign experts, senior representatives of The Trade, and experts on particular technologies – for instance, NII or AI. (For details on how interviewees were selected and interviews were conducted, see “[Interviews, site visits, and other research](#)”.) Research also included visits to major ports in foreign countries (Abu Dhabi, Singapore, and Australia), as well as visits to the port of Los Angeles/Long Beach, the port of Newark, Teterboro airport, and five land POEs on the southwest border (San Isidro, El Paso, Laredo, McAllen, and Rio Grande Valley). Naturally, research included extensive review of the academic and government literature, collectively covering hundreds of scholarly publications and a similar number of government documents, as well as articles and reports from foreign governments, multinational organizations, and the popular press. (See “[Sources Consulted](#)”.)

Although the findings in this Report have implications for foreign customs organizations, the intended audience is the United States government – specifically, U.S. Customs and Border Protection (CBP). In keeping with the intended scope of work, this Report is deliberately pitched at a strategic level, and it does not cover many nuances or permutations of the issues addressed. As one example, although the project involved extensive research on non-intrusive inspection (NII) technologies, it did not conduct a detailed review of specific technologies and vendors; rather, it focused on identifying potential technological limitations to the POE of the Future and how these might be overcome. For this reason, several appendices offer greater detail on certain elements of the Report. For instance, “[Additional detail on modes](#)” discusses the nuances of general aviation (GA), pedestrian and passenger vehicle crossing at the land POEs, and maritime containerized cargo, as well as issues specific to agriculture. Likewise, “[Scanning...for what?](#)” discusses which strategies for detection can be used for different types of contraband, and “[Harm reduction and opportunity cost of inspections](#)” offers a primitive framework for estimating the social return on investment to expanded cargo scanning.

Temporally, the Report focuses on the next 10-15 years – a period long enough to be useful in providing strategic vision but short enough that the most important parameters governing border management can be expected to remain constant or change in a reasonably predictable way. Because the vision articulated here represents a significant departure from CBP’s current strategy in some ways, the Report also offers certain intermediate steps (see, *inter alia*, “[Short, medium, and long-term steps on cargo](#)”).

This report does not address many aspects of CBP’s mission. For instance, it does not cover illegal entries between the POEs (e.g., land borders, coastline, illegal aviation and drones, or violations of maritime boundaries). Likewise, it does not delve into policy debates about legal migration, refugees, and asylees, except to the extent that these affect undocumented entry at POEs. Rather, the central objective is to provide a vision of and roadmap toward an ideal system of POE operations. This focus most directly involves CBP’s Office of Field Operations (OFO) and Office of International Trade (OT).

## **A STRATEGIC ORIENTATION**

Many interviewees, including senior managers at OFO, emphasized how valuable it would be to step back from regular activities and grapple with the bigger questions of how the agency can best position itself for the next decade or two. As one senior CBP official put it, leaders are saturated dealing with the “day-to-day”, in which the press of quotidian workflow and personnel management crowds out long-term strategizing; as a result, “the thinking about where we need to be in 5-10 years is not done.” CBP officials are not alone; interviews with current and former officials at customs agencies abroad, and even some conversations with private port operators, revealed the same desire for deeper reflection about how changes in globalization and technology will affect their mission.

At CBP, this desire reflects uncertainty over new challenges, such as those caused by the COVID pandemic or the emergence of new forms of trade restrictions that CBP must ultimately enforce, as well as the continued lack of clarity on old ones. But appetite for strategic thinking also reflects an increasing maturation of the U.S. homeland security enterprise as a whole and of CBP as an agency in particular. After more than two decades of successful adaptation and a proven track record of performance, CBP is better positioned than it has ever been to ask fundamental questions about the future of border management, articulate a new vision, and rally others around it.

## **OUTLINE OF THE REPORT**

[The next section](#) presents the foundational question of this Report: what do effective POE operations look like? It then asks how CBP and peer agencies have attempted to answer this question in a context of massive international trade and travel. It concludes that CBP faces distinctive challenges among border agencies in managing the borders of a very large, open economy where security concerns nonetheless remain intense.

[The third section](#) presents the “problem statement”: that is, the limitations of the current approach. Challenges include not only persistent unsolved problems (e.g., low inspection rates for contraband other than radioactive material, especially in the maritime environment, and the unfinished agenda of North American economic integration) but also novel concerns created by the changing nature of globalization (e.g., fear of the next major disruption, the proliferation of small shipments, and the growing salience of trade regulations).

[The fourth section](#) lays out the new vision of POEs of the future that responds to these novel challenges. In the cargo domain, the two most important pillars of this new regime are full supply chain transparency and the rebuttable presumption of inspection of all shipments. In the traveler domain, the central organizing principles are seamless travel and a new approach to digital privacy.

[The fifth section of the Report](#) discusses the obstacles to this vision and how they can best be addressed. CBP will need new authorities, technology, information, analytics, and partnerships, as well as some measure of internal restructuring and cultural reorientation. However, the agency has surmounted equally daunting obstacles before. It can certainly do so again.

## Introduction

### THE NATURE OF POE OPERATIONS

International ports of entry (POEs) exist to channel and document the movement of goods and people into and out of countries. As one interviewee put it, POE operations are designed to “reconcile the need for economic efficiency with sovereign regulatory authority.” Border agencies attempt to interdict “bad” people (terrorists, criminals, etc.) and things (contraband, infected livestock, counterfeit products, smuggled endangered species, people entering the country illegally, hitchhiking gastropods, etc.) while permitting the legitimate international trade and travel characteristic of modern economies. In theory, both security and facilitation are outputs of a well-run system.

Above and beyond the prevention of illegal activity, POEs also constitute crucial information portals for governments. Channeling the flow of goods and travelers through authorized crossing points allows governments to collect information about what comes into and goes out of their countries. This information is not only useful in assessing the risk that specific shipments or individuals pose and in tracking the spread of pests; it is also important for facilitating other government operations (e.g., census), designing regulations (e.g., tariffs or product safety), and reducing the general cost of economic information. Data collected by customs and immigration agencies allow governments to monitor everything from epidemiological trends to consumer preferences for foreign commodities.

Finally, POEs have historically been an opportunity for governments to collect revenue, primarily in the form of taxes on imports and exports. The growing capacity of national states to tax other forms of economic activity (property, inheritance, sales, income, etc.) and the global reduction of tariffs since World War II has dramatically reduced the importance of duty collection for customs agencies. However, duties remain an important source of revenue for some less developed countries with weak states, and retrenchment in economic globalization could modestly increase their importance. In addition, tariffs remain a common instrument of [industrial policy](#) to protect domestic industries or encourage reshoring; unless duties are actually imposed, this instrument cannot work as intended.

In sum, a well-designed system of POEs must perform the following functions:

- Collect useful data on shipments, travelers, etc.;
- Make determinations about shipment entry and traveler admissibility;
- Inspect shipments and people at high volume – ideally in ways that are reliable, predictable, streamlined, non-redundant, and low cost; and
- Collect any necessary fees, taxes, or duties.

In the modern era of globalized trade and travel, governments do not normally attempt to defend a demarcated line at the POEs. Rather they use their border authorities to secure flows of shipments and people (see Bersin 2012, Bersin and Karlsson 2019, Stodder 2020), collecting needed data and revenue along the way. The trend in customs and immigration has thus been to move inspection activities away from the physical border in order to avoid bottlenecks.

Handling of the COVID-19 pandemic highlighted the drawbacks of thinking in terms of lines rather than flows when it comes to border management. Efforts to prevent the virus from entering



countries universally failed. Most governments swiftly realized that a better use of public health measures at the border was to reduce risk, collect epidemiological data on prevalence and variants, and encourage positive individual behavior (e.g. vaccination) through travel requirements (see Benton et al. 2024). For air travel in particular, the trend over time was for transport carriers to require travelers to submit data in advance for health clearance rather than relying on symptom screening and interviews about last countries visited at the POEs themselves.

Organizations like CBP will always remain the “police at the border”, and there will always be inspections at POEs. In an ideal system, however, far less would actually happen at the border crossing itself; most activity at most POEs would be focused on random inspections and targeted enforcement actions. Much of the work of border management would be done in automated fashion (e.g., NII scanning and adjudication or identity verification via facial recognition) or behind the scenes (through data analysis and targeting). The ideal customs organizations are thus thoroughly digitalized, intelligence-driven agencies that spend as few of their resources as possible on rote, in-person processing.

### **STRATEGIES IN THE POST/911 WORLD**

Although government efforts to collect useful data and revenue can provoke resistance from The Trade, the much more common source of friction in modern POE operations concerns processing-induced delays. In the cargo environment, the multimodal GSS that has emerged over the last three decades (Flynn 2020) aims to squeeze out every bit of time and expense involved in transnational exchange, in order to meet business demands for just-in-time manufacturing and just-in-time inventory management. Efforts to improve efficiency are particularly focused on points in the chain where expensive conveyances must be kept moving (e.g., cargo ships or planes) and delays can be extremely costly (e.g., unloading berthed container vessels). The “need for speed” can create a tension between security and facilitation, especially at choke points in the GSS. Typically, governments are focused on the former (though with the understanding that keeping transactions costs low is important for broader economic growth) and private firms are focused on the latter (though with the understanding that security incidents which disrupt the flow of goods can prove devastating to their businesses).

The same tension between security and facilitation exists with respect to travel. In that domain, the main cost to society from delays are the opportunity cost of travelers’ time and the less efficient use of conveyances (airplanes, ferries, cruise ships, etc.). However, the indirect loss of revenue from tourism can also be a motivator for facilitation.

Countries with large tradable sectors and considerable international travel normally lack the ability to comprehensively inspect every person, conveyance, and shipment without imposing significant, economically destructive disruptions and transactions costs. One common approach in these circumstances is to base inspection decisions and resource allocation on risk (see Lawson 2020). There is virtual consensus in the international customs and border management communities, as well as within CBP, that POEs are most efficient when operational adjudications are based on potential threats, rather than on treating all entries similarly. The best way to employ scarce inspection and enforcement resources, as well as to minimize transactions costs, is to avoid spending time and resources on trusted travelers and shippers, concentrating instead on potentially high-risk and unfamiliar entries. One common metaphor – invoked by interviewees and scholars (*inter alia* Stodder 2020. Lawson 2020) alike – is the needle in a haystack: CBP must find

the very small “bad” thing (a needle) in the much larger flow of legitimate trade and travel (the haystack).

Governments have used five general strategies to achieve this goal:

- Advanced information on travelers and shipments;
- Targeting, ideally supported by artificial intelligence;
- Watchlisting
- Whitelisting (also known as “clearlisting”) and preclearance; and
- Reliance on rapid inspection technologies, also supported by artificial intelligence-based analysis of images.

In the haystack analogy, the first three of these help border authorities find the needle; the fourth helps to shrink the haystack. The fifth allows for large numbers of searches at scale.

Advanced information about shipments (such as customs manifests) and travelers (such as Passenger Name Record [PNR] data) can help customs authorities make decisions about risk away from the physical border and protect conveyances such as aircraft. In particular, sophisticated border management agencies can use algorithms to analyze the data provided, in order to identify entries that deserve greater scrutiny – that is, targeting. Some targeting rule-sets are very simple and POE-specific (e.g., Officers at the San Luis II POE should be on the lookout for recently washed white vans with Sinaloa license plates); others are considerably more complicated and draw on specific combinations of data elements, sometimes informed by AI.

Another risk-segmentation tool is the creation of both “whitelists” (of precleared or well-vetted travelers and shippers) and “watchlists” (of individuals, conveyances, and shipments thought to be dangerous or otherwise non-compliant). In the U.S. context, for instance, trusted traveler programs like SENTRI, NEXUS, and Global Entry, as well as the trusted shipper program Customs-Trade Partnership Against Terrorism (CTPAT) and the Free And Secure Trade (FAST) program for truckers, were designed to help CBP segment risk. A number of countries have adopted similar programs. The U.S. Terrorist Screening Database (TSDB) is the archetypal watchlist; however, watchlists and blacklists are also used to impede the travel of transnational criminals and people who pose a threat to public safety.

Efficiency in POE operations can also be enhanced by moving certain functions far away from choke points at the POEs, and then using secure corridors and container integrity monitoring for precleared entries. In other words, preclearance of people and cargo – combined with sterile corridors and (for containers) modern seal technology to prevent tampering – can reduce congestion at POEs. Because preclearance pulls out of the system shipments and passengers that presumably pose little or no risk at the time they cross the border, personnel at the POEs can concentrate their efforts on the rest of the flow.

Another way customs and immigration agencies have attempted to manage their dual mandate is through the deployment of new technologies that allow greater scrutiny of people, belongings, conveyances, containers, and other shipments in a short time and at scale. In the context of travelers and their luggage, magnetometers, x-ray machines, and millimeter wave scanners are all designed to eliminate certain risks without adding considerably to travel times. In the context of cargo, radiation portal monitors (RPMs), multi-energy and low energy scanning machines (MEPs and LEPs), and other forms of non-intrusive inspection play an analogous role.

Because different enforcement strategies are used in concert, CBP and peer agencies abroad often speak of a “layered approach” to security. The premise is that entries pass through a series of filters designed to intercept illicit, dangerous, or undesirable things. For instance, a passenger traveling into the United States through Miami International Airport has already been screened based on advanced information provided to the airlines, is searched by foreign airport authorities, is observed by CBP Officers upon arrival, may be sniffed by a dog trained to detect contraband, and so forth. Likewise, a cargo container from Japan may be inspected pre-departure, is screened based on manifest data and potential anomalies, may be reinspected by CBP upon arrival at a U.S. seaport, and is scanned for radiation as it leaves the terminal or port.

In some cases, these filters are designed to catch what other filters miss, as with rovers in an airport scrutinizing travelers who have already been screened at the National Targeting Center (NTC) for problematic travel histories, known violations, and potential risk to national security, or with shipments that first pass through a radiation portal monitor designed to detect radiation and separately through an MEP designed to detect contraband. In other cases, however, errors are serially correlated; a problematic entry that slips through one filter is highly likely to slip through another. In the context of international air travel, for instance, well-prepared “cleanskins” will not be identified by watchlists and probably will not be detected by either targeting rules or rovers. In the context of cargo, contraband within a maritime shipment declared to contain “Freight of All Kinds” (FAK) is unlikely to be identified. In addition, certain filters are far more porous than others. One example concerns containerized maritime cargo, in which only a tiny fraction of shipments that come from *unknown* or *untrusted* shippers are inspected. Furthermore, the customs manifest data on which screening is performed may be uninformative, misleading, or fraudulent, which can render targeting useless.

The United States has arguably made the most progress toward developing efficient POEs in keeping with these broadly endorsed approaches. However, other countries have embraced many of the same principles. For instance, Dutch Customs’s goals with respect to radiation scanning of shipments, which as in the United States is expected to achieve 100% of cargo, involves many of the same precepts (Heijmann et al. 2020: 134.)

The logical conclusion of technological development would be a regime in which all containers are inspected through non-intrusive scanning for a range of contraband without imposing severe transactions costs. An analogous situation in the traveler environment is comprehensive, universal inspection of passengers (via body scanners or, in an earlier era, magnetometers), inspection of their personal items (e.g., via X-ray), and inspection of their checked luggage. However, universal and comprehensive inspection can only be implemented without causing significant delays if it employs reliable, efficient, and low-cost NII equipment.

### **THE DISTINCTIVE SITUATION OF CBP**

Internationally, customs and immigration agencies have different rules about the prohibition or regulation of goods, as well as different priorities and risk thresholds. Many (e.g., India) still prioritize the collection of revenue, and others privilege facilitation over security and law enforcement considerations when it comes to travelers, cargo, or both. A few unusual cases (such as Israel and Saudi Arabia) go in the other direction, making security so paramount as to largely ignore concerns about inconveniencing travelers or slowing inbound shipments. Most countries adjust the balance between these goals depending on current threats or political considerations.

CBP and its peer agencies (especially the Five Eyes countries) face a dual security-facilitation mandate, with considerable pressure to achieve both goals in the cargo environment. Analogous situations exist in the passenger environment, with some countries (e.g., the Maldives and Croatia) much more concerned about facilitating tourism than preventing travelers from bringing in contraband.

However, as one former senior CBP official pointed out, only a few other customs organizations in the world conceive of their role in the same way as CBP. Many are not law enforcement organizations; very few focus on counterterrorism (CT). Even compared to peer agencies in the Five Eyes countries, CBP faces unique pressures. As the world's largest importer, the United States remains highly open to international commerce; in fiscal year 2023 (FY2023), CBP processed over 36.6 million cargo containers and collected approximately \$100 billion in duties, taxes, and fees (CBP 2024b). To put this figure in perspective, the money collected by CBP each year would pay for CBP's own budget five times over – or alternatively, for approximately six National School Lunch Programs or ten National Science Foundations. The same period saw 1.066 billion *de minimis* (i.e., valued at \$800 or less) shipments – approximately four million per day. When it comes to travelers, the United States has the largest number of international airports in the world, with approximately 125 million air passengers arriving from abroad each year. Its two land borders are the busiest in the world in terms of both travel and trade, with close to three hundred million legal border crossings within North America in a typical (non-pandemic) year.

The magnitude of enforcement is equally breathtaking. CBP is in charge of enforcing more than 500 different laws and regulations on behalf of 47 government agencies. To take just one type of violation, in FY2023, CBP denied entry to 3,976 shipments totaling \$750M in value on the grounds that they violated the Uyghur Forced Labor Prevention Act (UFLPA) (CBP 2024b).

CBP faces not only a much more extensive task than peer agencies but also distinctive pressure to excel at *both* security and facilitation. Poor border management by CBP would introduce significant transactions costs. On the traveler side, it would also create social costs, given that efficient border crossing for travelers at land POEs is of tremendous importance to the binational communities that dot and span America's two frontiers. At the same time, the terrorist attacks of September 11, 2001 (9/11) focused U.S. government attention on security, especially counterterrorism. Since then, fear of letting through a single terrorist or “bomb in a box” has led to extraordinary precautions and federal outlays. As one interviewee put it: “You never want to be the one to let it [a bad thing] through.” Another noted that “the one guy who gets through” America's CT screening apparatus would “change the entire political discussion”.

In addition to CT concerns, CBP must attempt to prevent undocumented migration, drug trafficking, and other forms of contraband smuggling – of which the United States sees far more than the typical country. The issue of drug trafficking periodically attracts significant public attention, while the issue of undocumented migration has become increasingly salient and contentious. Finally, as the United States has layered on more environmental, social, and governance (ESG) regulations and imposed more tariffs, CBP must also perform well at intercepting articles that are not inherently prohibited but nonetheless are illegal because they violate trade laws.

Because of the nature of the environment in which it operates, CBP finds itself in the middle of “a constant blame game” when the agency is perceived as erring in one direction or another (or

possibly in apparently opposite directions at the same time). As one interviewee pointed out, delays at the U.S.-Mexico border have at some points provoked howls of protest from local governments and constituencies, which rapidly translate into congressional pressure on CBP to prioritize facilitation. On the other hand, spikes in fentanyl overdoses or undocumented migration also produce calls for stricter border enforcement at the POEs as well as between them.

One senior official noted that CBP “still does not have an institutional answer to this question.” Instead, as another interviewee put it, the agency is continually “coping” and “juggling” the demands of outside constituencies and multiple political principals. Sometimes “constant pressures and shifts in priorities” mean that CBP is engaged in a “whack-a-mole dynamic.” Another interviewee likened the situation to being continuously buffeted by outside pressures, not all of which can be anticipated. This sense of whiplash is even more pronounced in a politically polarized Washington environment, in which CBP (by virtue of its role in immigration enforcement, both at and between the ports of entry) is increasingly entangled. More than any other customs or immigration authority, then, CBP must excel at *both* security and facilitation if it is to be perceived as successful.

Foreign interviewees were not always complimentary about CBP, noting that it was more focused on security, more “hidebound”, more “hermetic”, less responsive, less transparent, and often more difficult to deal with than peer organizations (including those from the other Five Eyes countries). At the same time, many of these same individuals also recognized CBP’s leadership within the international customs community and its role in the forefront of developing new security applications. A few even acknowledged the distinctively challenging position in which CBP finds itself.

CBP’s unique situation does not mean it has nothing to learn from the rest of the world. The experiences of foreign countries provide valuable lessons with respect to privacy and data management, seamless travel at airports, NII inspection at seaports, workforce management, pandemic planning, and so forth, many of which are noted in this Report. Because CBP remains exceptional in the challenges it faces, it will require exceptional levels of creativity and diligence to address those challenges.

## The limits of the current regime

The post-9/11 regime has been extremely effective in delivering considerably greater security while still permitting rapid, low-cost global trade and travel. Watchlisting, targeting, and strong international partnerships forged by CBP and the U.S. Intelligence Community (IC) have successfully prevented the entry into the United States of known or suspected terrorists (KSTs). Border controls have also reduced or raised the costs of certain forms of smuggling and (through the development of a transnational organized crime watch list) the movement of serious criminals. New data requirements have provided CBP with much greater information on shipments and international travelers, while voluntary vetted traveler and shipper programs have effectively removed a significant portion of cargo and passengers from the massive flows that CBP must secure. Many of the innovations developed in the United States have become part of international law (e.g., data requirements) or been adopted by other countries (e.g., trusted traveler and shipper programs). In the two decades since it was created, CBP has amassed a remarkable series of achievements.

At the same time, the post-9/11 regime has been less effective in accomplishing certain goals in the current era of globalization. One interviewee emphasized that the United States's largest trading partner, China, is "not a transparent player in the international trade arena"; it declines to permit CTPAT validations and does not allow NII equipment into their ports to scan outbound cargo. As a result, a larger portion of U.S. trade comes from a non-trusted partner than was the case two decades ago. Furthermore, there is little to suggest that China's role in the international economy will disappear – even if partial decoupling of the American and Chinese economies is realized – nor that relations between China and the United States will soon allow for closer cooperation in managing the GSS. As one senior CBP official pointed out, the agency must continue to find a way to implement policies designed to contain or punish China – such as AD/CVDs, the UFLPA, or scrutiny of Chinese researchers – while also cooperating with it on other issues (e.g., preventing fentanyl trafficking and facilitating legitimate trade).

### CARGO INSPECTION

America's system of POEs does not detect a good deal of run-of-the-mill smuggling (including large amounts of illegal drugs). One reason is that, although 100% of cargo is scanned for radiation, a much smaller fraction is inspected (through scanning or manually) in a way that could identify most contraband. In the maritime environment, in particular, the United States inspects only a tiny percentage of the *non*-trusted shipments arriving at U.S. ports and lags behind many countries in the percentage of containers it inspects.

Most officials and experts express skepticism about the potential of border controls to prevent smuggling, and this is particularly true when it comes to high-value, easily concealable material (such as fentanyl). As one interviewee put it, "we'll never win the war on drugs at the border." When political pressure rises to address certain types of contraband or smuggling vectors, CBP is sometimes in the awkward situation of trying to push back on the practicalities without being able to offer alternatives, provide innovative solutions, or point to strategic plans that would – if implemented and funded – inevitably address the concerns.

The current regime has also come under congressional scrutiny for failing to "push out the borders" on *radiation* scanning. Although CBP scans 100% of cargo for radiation – a remarkable

achievement – the overwhelming majority of shipments are scanned after arrival or at the physical frontier. In theory, the dreaded (and thus far imaginary) “bomb in the box” could do tremendous damage if it were detonated at a maritime port of entry after arriving in the United States (e.g., Miami or Newark) but before passing through an RPM. One senior former official argued that the 100% radiation scanning mandate has in effect “brought the bomb to Los Angeles” (while also noting that there has not, in fact, been any bomb). Furthermore, containers often reside for days in areas of maritime ports that CBP does not control before being scanned upon exit from the terminal or port, making it possible for terrorists or criminals to spirit a device away.

CBP’s attempts to identify loose radioactive material abroad through the Secure Freight Initiative (SFI) and (in theory) the Container Security Initiative (CSI), however, have proven problematic. These programs cover only a small portion of ports, excluding locations in East Asia, South Asia, and Russia that would be the most likely nodes for smuggled nuclear material. Furthermore, even at CSI ports, only a tiny fraction of containers bound for the United States are inspected. Finally, CSI inspections depend on the cooperation of local authorities rather than exclusively on CBP’s judgment; some high-risk containers are not inspected until arrival.

Again, experts on non-proliferation expressed skepticism that the best way to control fissile material, chemical weapons, or bioweapons is through better policing the GSS; they tended to regard source controls and – to a lesser extent, surveillance at key nodes – as much more effective. Although some unauthorized radioactive materials have occasionally been found in the GSS (Flynn 2020), no nuclear or radiological weapon has ever been intercepted. Nevertheless, criticism from some quarters of CBP’s inability to implement pre-arrival scanning for radiation remains.

A number of CBP officials noted that radiation scanning has actually been highly successful in some regards. To achieve 100% scanning without causing massive delays in shipping is indeed an achievement, and puts CBP in a strong position to respond to nuclear threats should they arise as a result of its investments to date. Furthermore, its implementation could provide useful lessons for installing scanners designed to detect much more common forms of smuggling. From this perspective, the goal should be to celebrate the victory from radiation scanning efforts, improve scanning at seaports (e.g., by bringing RPMs closer to the front-end of the off-loading process), and use the implementation of 100% scanning for radiation as a road map for deploying different sorts of NII.

In the maritime environment, rates of inspection other than for radiation remain extremely low and have actually declined over the last decade. The overwhelming portion (perhaps 98%) of cargo containers from *non*-trusted entities – i.e., shipments outside of CTPAT – go uninspected for any type of contraband at any point in their journey. Consequently, there is currently little incentive for foreign countries to make the investments necessary to become trusted partners, for entities like terminal operators to invest in scanning equipment, for shippers to develop new technologies that would be able to inspect cargo during its voyage, or for customs brokers and freight forwarders to behave scrupulously. As one senior CBP official noted, in the maritime environment, firms now perceive little benefit to joining CTPAT because they already receive timely and reliable release of their shipments. All of these actors would only face a different set of incentives if CBP committed to inspect a higher percentage of non-trusted cargo and then began actually ramping up inspections at seaports.

Another longstanding concern with the current regime is the dearth of outbound inspection. Outbound has long been problematic for CBP, which lacks the data to do useful targeting and (in some cases) the infrastructure to conduct outbound searches without imposing significant delays. Lack of outbound inspection along the southwest border was long regarded as particularly problematic when it came to efforts to combat Transnational Criminal Organizations (TCOs), which smuggled guns, ammunition, and bulk cash south while sending drugs north. The emergence of cryptocurrency has considerably reduced bulk cash smuggling, though CBP still seizes \$50 million in cash and equivalents each year (CBP 2024d). However, the need to enforce national security export restrictions – in which contraband typically exits the U.S. through other modes – has increased. Consequently, outbound remains an important lacuna in the current regime, even if the specific threats have shifted.

### **THE GROWING CHALLENGE OF TRADE VIOLATIONS**

These persistent concerns in cargo inspection, however, pale by comparison to those created by the changing nature of globalization. Perhaps the most important is the increasing salience of new forms of trade regulations: anti-dumping and countervailing duties (AD/CVD), ordinary tariffs and rules of origin, concerns about forced labor, carbon content, goods whose production is environmentally destructive, and the like. As one interviewee put it, risk assessment in the past revolved around the “war on terror” and the “war on drugs” and sought to identify the “bomb in the box” and “drugs in the container.” Going forward, however, identifying tariff avoidance and ESG violations is likely to loom relatively larger within CBP’s mission. Not only is some degree of managed trade endorsed by both major American political parties – with the Biden Administration leaving in place the Trump Administration AD/CVD tariffs on Chinese products – it is also possible that tariffs could rise across the board in the future.

Although traditional smuggling can (at least theoretically) be addressed by expanded NII, scanning can very rarely capture many types of trade violations. In some cases (e.g., the different chemical composition of tires produced in China versus Mexico), sensors could be devised and deployed that would detect violations at scale. CBP’s Centers of Excellence and Expertise (CEEs) can also be very helpful in determining whether goods were violatory, and manual inspection can identify certain problems – e.g., product safety and some intellectual property (IP) infringement. Most of the time, however, even detailed manual inspection or examination will not allow Officers to determine whether a shipment violates trade laws.

To date, CBP and peer entities have developed several valuable tools to identify trade violations. These include:

- Formal and informal partnerships with large, often retail-oriented firms that have a strong business incentive to police their own supply chains, prevent copyright infringement, and the like;
- Portals that allow tipsters to report on trade violations (such as through the Enforce and Protect Act, or EAPA, typically by business competitors of violators); and
- Targeting that uses manifest and other data to flag potential violations.

However, there are serious limitations to this strategy, especially when it comes to country-of-origin certification (*inter alia* Labuda 2017). Current data are insufficiently reliable to allow CBP to identify violations systematically.

Several developments over the last five years suggest the future direction of U.S. trade policy and the next phase of globalization more generally. First, CBP’s only comprehensive reauthorization,



the Trade Facilitation and Trade Enforcement Act (TFTEA) of 2015, underscored the importance of enforcing trade policy. Second, the Enforce and Protect Act of 2015 (part of the larger TFTEA) and increasing use of AD/CVD has demonstrated American willingness to penalize foreign manufacturers that violate U.S. strictures on managed trade. Third, the renegotiation of the 1994 North American Free Trade Agreement (NAFTA) as the USMCA (which entered into force in 2020) enhanced continental rules of origin (ROOs). Fourth, UFLPA in 2021 effectively required firms doing business in China to demonstrate that their entire supply chain was untainted by forced labor; because businesses with multilevel supply chains in China often lacked adequate information about their inputs, they had to risk penalties or relocate. Fifth, though not specifically a trade bill, the CHIPS and Science Act of 2022 encouraged domestic semiconductor manufacturing in an effort to protect American supply chain security and counter Chinese dominance. Sixth, impending enforcement of Phase VII of the Lacey Act (in December 2024) requires extensive new declarations on plant products (e.g., wood); a contemplated but not yet scheduled Phase VIII will apply similar reporting requirements for fully composite materials. Seventh, a number of legislative proposals in circulation would address various other types of trade violations, such as changes to *de minimis* rules, the FORCE Act that aimed to prevent deforestation, and so forth.

In the case of ROOs and tariffs, the goal of policy was not to increase government revenue, nor was it to facilitate trade. Rather, tariffs and other restrictions were imposed to encourage disinvestment from some places (specifically, China) and to incentivize reshoring or nearshoring. Because such a strategy only works if the regulations are properly enforced, this neo-mercantilist shift effectively converts CBP into an instrument of American industrial policy. In other words, CBP's contribution to economic growth in the future would not be revenue collection or even trade facilitation but rather the enforcement of an emerging "fair trade" regime.

Current policies leave CBP badly handicapped in its efforts to deliver on this objective. As interviewees repeatedly pointed out, the quality and quantity of the information CBP receives from The Trade are grossly inadequate to permit accurate targeting of trade violations. One interviewee noted that the problem seems so intractable that CBP has been impelled to "layer more and more data requirements on The Trade" in order to obtain better information, while at the same time "continuing to punt the government's responsibilities [for verifying what shipments actually contain] to customs brokers, carriers, and importers" who often have little interest in policing the quality of the data they provide. Even if CBP is able to impose penalties on specific purveyors of bad information, the least scrupulous brokers may dissolve their entity but then reappear under a new auspice. Several interviewees further noted bad data not only prevents identification of specific violatory shipments but could pollute targeting efforts as a whole, because training artificial intelligence programs (AIPs) on false, misleading, or incomplete data leads to a "garbage in, garbage out" (GIGO) result.

At the same time bad data compromises security in the GSS, CBP simultaneously faces pressure from The Trade to provide preclearance for trade violations at point of departure, thus ensuring that shipments will not be held up upon arrival. Inspections at POEs that significantly impeded movement through the GSS – as would be required were CBP to aggressively enforce trade regulations with current tools – would provoke an enormous backlash. The current approach to data acquisition and verification is thus unsustainable from the perspective of either the government or The Trade.

One final limitation concerns enforcement and investigation of violatory practices. Historically, trade violations have been viewed as less problematic than national security concerns or traditional contraband (e.g., drugs). Criminal penalties for smuggling fake purses, mislabeled products, undervalued dutiable shipments, or even unsafe products remain considerably lower than penalties from smuggling drugs and explosives. To execute on current and likely future policies, however, CBP must have the ability to impose penalties for trade violations that are sizeable, predictable, and swift enough to change the behavior of private actors. Furthermore, there must be vigorous investigation of actors involved in violating trade laws.

#### **THE DIZZYING GROWTH OF SMALL SHIPMENTS**

A second problematic trend in the new era of globalization is the proliferation of small shipments, sometimes combined into containers and sometimes shipped via mail or express consignment operators (e.g., DHL, UPS or FedEx). The increase in such shipments has been driven primarily by e-commerce and direct-to-consumer sales from foreign businesses, both of which accelerated during the COVID pandemic. This problem is widely acknowledged not only by CBP officials but by many foreign border agencies (Blegen 2020). In fact, the challenge affects foreign customs authorities as much or more than it does CBP; the growth of e-commerce is particularly problematic where there is far greater reliance on value-added and sales taxes, as in Europe (Antov 2023).

To a greater or lesser extent, all senior officials interviewed noted the rise of increasing international purchases valued at less than \$800 and the problems it creates. With four million packages last year, the challenge is indeed daunting. One senior former official argued that America has effectively moved to a “*de minimis* economy” with respect to international consumer sales – one that might herald the end of brick-and-mortar retail and with it the large international shipments to trusted major outlets that have made considerable progress in securing their own supply chains. Another senior former official added that the term *de minimis* (“pertaining to minimal things”) has in a sense become an oxymoron, given how prevalent such shipments are. Because many parcels qualify for *de minimis*, data on them is limited – for instance, a CBP Form 7501 entry summary is not required and there is no Importer of Record. Furthermore, despite recent initiatives regarding air shipments, such parcels are rarely inspected.

Unfortunately, these small shipments are not necessarily low risk; the government continues to find prohibited materials in them. One senior CBP official in the field pointed out that smugglers were so unconcerned about the prospect of interdiction that they offered customers a money-back guarantee if drugs did not reach them. Other current and former officials noted that *de minimis* is sometimes used incorrectly (or fraudulently) to avoid trade regulations that would apply to larger shipments – a trend that has attracted congressional scrutiny and recent Administrative action (*inter alia* JDSUPRA 2024, White House 2024b, DHS 2024, White House 2024a). Yet another former official emphasized that products from certain major online retailers abroad frequently involve intellectual property (IP) and other trade violations.

The proliferation of small, direct-to-consumer shipments is challenging in several other ways as well.

- The stuffing of large numbers of separate packages together inside a single container makes interpretation of NII images considerably more difficult, especially given current technology.
- Shipments containing many small packages are often prepared by smaller or less well-known brokers and freight forwarders, who in turn often provide uninformative descriptions of the

cargo. When manifest data is uninformative (e.g., FAK) or nonexistent (as with airmail), inspection constitutes the only mechanism for assessing a shipment's risk.

- Mechanically, when CBP seeks to examine a particular package within a larger container, it holds all the shipments in that container, slowing down commerce.
- The equipment and mechanisms for inspection (e.g., of international airmail) remain limited.
- Small shipments found to be violatory may be abandoned, forcing CBP to absorb the costs of disposing of the material.

One possible response – and the one being adopted in the EU – would be to drive the dollar-value of *de minimis* far below its current levels. A very different approach would be to consider from first principles the purpose of the *de minimis* category. Does basing exemptions from normal trade regulations on the estimated dollar-value of a shipment truly capture a relevant category of goods that deserves to be free of inspection, or is this approach simply a historical anachronism dating back to when U.S. Customs focused primarily on revenue-collection? Today's CBP presumably cares much more about the risk posed by shipments, which in turn is a function of factors like country of origin, type of commodity, and the likelihood that a shipment contains contraband. Whatever the approach, CBP needs a crisp answer to how existing laws and regulations can be practically enforced with respect to small shipments.

#### **THE UNFINISHED AGENDA OF NORTH AMERICAN ECONOMIC INTEGRATION**

CBP has created a wide array of partnerships within North America aimed at pushing out the continental border in order to permit freer flows of goods and lawful travelers within the USMCA region. Successive administrations have developed a framework of collaborative border management that benefits all three countries (White House 2011, White House 2010). The last three decades have seen information-sharing among customs agencies (e.g., license plate readers on the southwest border), counterterrorism collaboration (as with the Joint Security Program with Mexico), the end of cabotage restrictions, preclearance, and myriad other victories. One striking recent development is that CBP will conduct pre-primary NII at the Douglas, Arizona POE in Mexico. Attempts to manage the North American customs agenda through the Border Interagency Executive Council (BIEC) and Interagency Policy Committees (IPCs) chaired by the National Security Council staff have also been valuable.

Despite this progress, some of the obstacles to better border management have what one interviewee described as a “reverse Rip van Winkle quality”: awakening after twenty years of slumber, an observer might find certain ancient problems unsolved. One example – mentioned with frustration by several interviewees – was the failure of the Port Rupert preclearance experiment with Canada. Even though Canada is the United States's closest partner, small differences in data requirements and border authorities (e.g., on agricultural inspection) frustrated a natural potential collaboration. Similar frustrations have long been expressed by The Trade with regard to the lack of single-entry processing, single inspection, the opportunity to create “Green Lanes” for precleared trucks, and the state of the Ambassador Bridge. On both the northern and southern border, separate POEs continue to be built or refurbished, when the manifestly preferable outcome would be to have a single, binational POE straddling the frontier. Finally, as several interviewees pointed out, the persistence of *de facto* cabotage restrictions in trucking continues to create major inefficiencies at the southwest border. The importance of reducing transactions costs within North America will only grow as an emphasis on regional supply chain security increases.

Many of these challenges, of course, are largely outside CBP's control; solutions depend primarily on political will at the top of the U.S., Canadian, and Mexican governments. However, the unfinished North American agenda does highlight the limits of the current system, and it inevitably affects CBP. If CBP is to be seen as part of the solution rather than part of the problem, it will need to articulate a vision for future trade integration in North America and advocate for it within the U.S. government, rather than be in the position of focusing on implementation obstacles or instinctively defending standard operating procedures.

When it comes to travelers at the land border, the current regime has struggled to provide effective risk-based assessment concerns passenger vehicles and pedestrians. In both cases, one signal problem is the absence of advanced information. For passenger vehicles, CBP faces the added difficulties that current technologies do not permit (1) facial comparison for passengers (rather than the driver) and (2) scanning of the conveyance at high speed that is adequate to detect most contraband. As discussed below, these technologies are likely to be developed over the next decade, provided CBP makes the public commitment to deploy them once they come online. In fact, CBP is already making considerable progress on expanding basic x-ray imaging of passenger cars, informally articulating a goal of 40% inspection (as well as 70% inspection for trucks) in response to Congressional pressure.

Another problem at the land borders, particularly with pedestrians, is the absence of a single, fraud proof identity document. Even if facial comparison technology were fully deployed at all land ports, a significant number of travelers would not be in the digital archive. As one interviewee noted, a "vast array of documents" are currently permitted to establish identity, offering the example of an individual with a forty-year-old birth certificate from Kansas that has been folded and unfolded a few dozen times. The plethora of acceptable documents only encourages the proliferation of fraudulent identity cards.

#### **INTERNATIONAL TRAVEL AND ITS DISCONTENTS**

Despite increasing digitalization, a quarter of the way through the 21<sup>st</sup> century, the international travel experience is anything but seamless. Air passengers must frequently verify their identity more than once. At the land border, travelers still use a variety of documents. Primary inspection remains common.

In terms of risk management, CBP's vetted programs do not approach the "[80/20 rule](#)". Whereas CTPAT members account for approximately half of all cargo containers entering the United States, SENTRI and NEXUS covers only about one sixth of land border crossings, and Global Entry members constitute less than one one-hundredth of all international air passenger entries (Lawson 2020: 115). Huge amounts of hay remain in the stack.

CBP fares better in the passenger environment with respect to finding needles, especially when it comes to the use of CT watchlists; however, targeting algorithms used to identify smugglers or dangerous individuals tend to have very, very high false positive rates – typically, well over 90% (Lawson 2020). One problem is the nature of the data to which CBP has access, which is often quite limited or focused on CT. For travelers at the land borders, whether they cross as pedestrians or in private cars, CBP normally has minimal advanced information.

Another challenge in the travel environment concerns public health. Several interviewees – including current officials, former officials, and senior managers at seaports – expressed

skepticism that as much had actually been learned from the COVID experience as should have been, and consequently whether customs organizations around the world (including CBP) would be well-positioned to confront the next pandemic without shutting down travel. These concerns extended beyond simply managing flows of travelers to supply chain disruptions.

A sound strategy for managing future pandemics is not only a public health imperative but also a trade and economic imperative. Initial uncertainty about the lethality and spread of the virus triggered border closures and travel restrictions that were often too late and too leaky to contain the pandemic, and they were retained far beyond their utility. Border closures ranged from debilitating impact on the international travel industry to the direct loss of user fees collected from travelers. As numerous interviewees pointed out, port shutdowns and delays in the supply chain also had reverberating effects, some of which are still felt today.

### **ADDRESSING THE NEXT DISASTER**

Homeland security is often an exercise in trying not to be devastated when taken by surprise (Lawson 2021). For instance, no one could have predicted the emergence of the specific virus that caused COVID 19, nor that its emergence would provoke such an extreme and pervasive policy response from almost all governments. The next pandemic that threatens international travel is unlikely to resemble COVID, and the next major disruptor is unlikely to be a pandemic (though future global pandemics are inevitable). How can CBP prepare for the fact that unanticipated disruptions will occur?

One example concerns supply chain disruptions and incidents at key ports that interfere with the GSS. Not only must the ports of the future be resilient ports, but the GSS itself must be rendered as resilient as possible. As one foreign interviewee put it:

We don't know what is coming, but you can't imagine there won't be something to happen in the world, otherwise it wouldn't be exciting to live in. We think that the answer lies in being flexible and be more adaptive to crises. What we learned from COVID [is that] we will still have the same problem [if a similar episode reoccurs]. Because China closed down, and then Europe went down – it was an imbalance in supply chain. If a port closes down, what are the alternatives, can we manage it as a whole system, can we work around it? We need to at least be very smart about the goods you truly need like food and medicine. That is information that is out there and not being shared. That can be more well managed.

As this lengthy description suggests, one crucial problem is that much of the information needed to understand and manage the GSS and global travel networks remains stove-piped. This fact impedes identification of vulnerabilities before a disaster, timely response to that disaster, and rapid forensic analysis afterwards.

Several interviewees also raised the question of “cybersecurity” when it comes to CBP operations and the GSS more broadly. Specific examples ranged from concerns about Chinese components in large gantry cranes to potential failure of TECS (the workhorse law enforcement system on which CBP relies) or ACE to hacking of personally identified information (PII) to cryptocurrency. In part, this variety reflects the inappropriately capacious term “cybersecurity”, which comprises three very different challenges: data integrity and breaches, information technology (IT) that can be disrupted by ransomware and DDOS attacks, and operating technology. The issue of data is addressed in discussions of [privacy](#). Protection of IT systems against potentially costly

ransomware attacks is no more and no less relevant to CBP than it is to other agencies and firms, and it deserves to be prioritized using standard cybersecurity measures. The issue of operating technology, which can normally be addressed by air-gapping or regulation of components, is not covered here. Although isolated attacks can cause disruptions (as the February 2022 Expeditors attack showed), concerted cyberattacks on port operating technology that seriously affected the GSS are not particularly plausible in peacetime (Atkins and Lawson 2020, Durkovich 2020, Carlin and Brill 2020).

These concerns do, however, raise the larger issue of resilience: having the necessary redundancy in the system to prevent failure, the ability to recover in the wake of a failure, or both. The future system of border management must be a resilient system. The current GSS and the global air travel systems are designed to minimize costs and delays, which deliberately limit redundancy. This fact underscores the importance of swift recovery and business resumption (Flynn 2007, Linkov et al. 2013, Flynn 2020, Rodríguez 2022). Perhaps the most important ingredient in business resumption is information, which allows policymakers and border authorities both to conduct rapid forensic analysis and to reroute traffic in response to specific incidents, thereby forestalling full-fledged border closures or systemic failure. In general, the necessary information already resides in the system but is not shared.

## A vision for the future

Despite dramatic improvements over the last two decades, the current global system constitutes a patchwork of partial fixes that only inadequately secure flows across national boundaries. The ultimate goal for governments should not simply be to intercept specific shipments of contraband but rather to use emerging technologies to assert government control over global travel and a GSS that has emerged without comprehensive regulation (Flynn 2020). In this new environment, “100% scanning,” “universal inspection,” “supply chain transparency,” and “seamless travel” mean something different from what they did after the terrorist attacks of 9/11, and such aspirations are much less utopian.

In the port of the future, as one senior foreign official put it, “much less would happen at the border than currently does.” In the passenger domain, most travelers would move seamlessly through the system without being required to stop and queue periodically for document checks; inspections would be primarily based on random checks, some secondary inspections, and targeted enforcement actions. This regime does not mean that what happens at the border “should be boring” – something one interviewee suggested but with which almost all current and former CBP officials disagreed. Nor does it mean (as one European interviewee put it) that “the best POE is one where there is essentially nothing to see.” Rather, most processing would be automated and border crossing would be seamless for the great bulk of travelers and many shipments.

In some modes, it might still be most efficient for non-intrusive inspection to occur at or very near the physical border, as with passenger cars and trucks. Furthermore, officer intuition, secondary inspections, and POE-based targeting would remain key components of the system, and CBP Officers would still be the final adjudicators of admissibility. Nevertheless, much of the work of identifying threats and making determinations about which entries merit further scrutiny should be done beforehand.

Application of this new regime must be tailored to modes (maritime cargo, rail, trucks, passenger vehicles, pedestrians, maritime passengers, express consignment, airmail, etc.), as well as the idiosyncrasies of particular POEs (especially seaports). For instance, advanced information and preclearance of travelers are typically more challenging at land borders; mandatory information-sharing among all actors via PCSs is particularly essential at seaports; and some land POEs may require changes in physical footprint to accommodate new scanning equipment. Nevertheless, the same broad vision applies to all modes.

As one interviewee put it, “everything about the POE of the future should be smart,” with a heavy reliance on information-sharing, AI, and automation. Erecting such a smart system builds on many of the successes to date in border management, and it echoes the emphasis of CBP’s current leadership to make the agency “intelligence-driven.” However, some of the measures involved in getting to fully smart POEs represent a departure from CBP’s existing strategy. For instance, creating a “smarter border” involves CBP making an explicit commitment to greatly expanded NII, full supply chain transparency, AI-assisted analysis of supply chain data that require new investments in systems, greater bidirectional sharing of information with the private sector, and seamless travel in the passenger environment. Such public commitments will stimulate investment and innovation in NII, AI, facial recognition, and other technologies necessary to further advance the vision. They will also serve to guide and justify CBP budgetary requests regarding

investments in technology, systems, staffing, and POE layout. Erecting the new system will take at least a decade and require painstaking attention to domestic and international partnerships. Once established, however, the new regime will provide for faster and more predictable processing of shipments, while also being better at intercepting contraband, protecting American consumers from fraud, and supporting American trade policy.

#### **THE PRESUMPTION OF INSPECTION FOR ALL CARGO**

Border management in the future should be based on the rebuttable presumption that *all* entries require inspection. There should also be an identified point of responsibility for every item in a container at each step in transit. Furthermore, fines and other penalties for violations must be scaled and applied in such a way that they actually deter criminal activity.

In its most extreme form, the notion of a rebuttable presumption for inspection would mean that each and every shipment passed through NII designed to detect a broad swath of contraband. Whether such a regime would be worth the costs is not always clear. Nevertheless, the ideal system clearly includes a much greater level of inspection than is currently the case, in order to both intercept unlawful entries and stimulate self-policing by The Trade.

The fact that inspections should increase does not mean that CBP itself will always be the one conducting the inspections, nor would they always be done at the U.S. border. Rather, shipments would be inspected in the least disruptive way possible (e.g., through new non-intrusive scanning technologies) and at the least disruptive place in the supply chain (a trusted foreign port, at the factory gate of a trusted partner, while a conveyance is in transit, etc.). In the case of international air freight, for instance, virtually all scanning should be pre-departure. In the case of maritime shipments, inspection could be done in the United States, whether during offloading by prime movers (with secondary inspection facilities located inside the terminal) or upon exiting a terminal or port; however, it could also be done at trusted foreign terminals, typically during off-load for transshipped cargo and at the port or terminal entrance for direct exports, or in transit. In the case of land POEs, there could be greater cargo preclearance with sterile corridors, digital seals, geo-tracking, and dedicated lanes at the border.

The expectation also is that Canadian and Mexican seaports would become trusted partners with levels of inspection comparable to that for shipments arriving directly in American ports – in a successful version of the Port Rupert experiment – obviating the need for shipments to then be re-inspected at the U.S. border. Only in the case of mail depots and passenger conveyances at the land border would NII normally be done at the POE.

Equally important, the expectation is that each shipment should only be inspected once. CBP cannot and should not cede its ultimate authority to inspect already cleared cargo if information acquired during a container's transit reveals a threat, and it may also conduct occasional random inspections of precleared shipments upon arrival. However, The Trade should be able to operate on the assumption that maritime cargo which has already been scanned will largely be precleared once it is loaded onto an oceangoing vessel; the same holds true for at least some cargo coming over the land borders via truck and rail.

There are several reasons why considerable increases in scanning are desirable. First, as many interviewees acknowledged, “stuff is still getting in.” Even if universal or near-universal inspection would not necessarily prevent many types of smuggling, [including drug trafficking](#), it constitutes a



deterrent for other types (e.g., live animals or people). Second, few if any interviewees were willing to contend that the current system at seaports – in which approximately 98% of *non*-trusted cargo is never inspected at any point in its journey, and the default is that containers sail through the GSS unless CBP affirmatively places a hold on them – constituted an ideal regime. Several noted that if the border regime were created from scratch today, with current levels of technology and likely future innovations in NII, it would take the form of universal inspection.

Almost all acknowledged that universal inspection of air freight was desirable and that the original ACAS regime had developed appropriately – that is, in partnership with the private sector and with companies covering the cost of predeparture scanning. Others noted that universal inspection of international airmail at depots was the likely and appropriate future direction for that mode. One interviewee also noted that replacing existing RPMs as they age out with more sophisticated NII trained to detect multiple forms of contraband could constitute a relatively painless transition toward 100% NII in many port environments.

Other officials suggested that a combination of technologies could be deployed for maritime cargo, including image capture pre-departure (but post-stuffing), use of novel detection technologies during ocean voyage, and possible scanning for other forms of contraband within a U.S. port or upon leaving it. Still others pointed out that an ensemble solution might end up being easier to implement on the southwest border than is currently believed, especially as technology evolves. Interviewees from the private sector noted that CBP's commitment to increase scanning rates would generate considerable investment in new technologies, which would in turn considerably lower the cost and improve the quality of scanning.

For many current and former officials at CBP, the notion of 100% inspection of cargo evokes unpleasant memories of the 100% scanning-for-radiation mandate. Most (though not all) officials were skeptical of the value and even feasibility of universal inspection for maritime cargo; several argued that it was not clear what problem “it was trying to solve,” and one senior former official insisted that maritime containerized cargo has always been low-risk: terrorists have continued to focus possible attacks on airplanes, and the southwest border remains the main vector for drugs. Several interviewees also emphasized the limitations of what images could detect given current technology. Almost all pointed out the inadequacy of the images from MEPs recently deployed at some POEs along the southwest border (which are based on only seven slices and produce non-rotatable visualizations).

A number of interviewees pointed out that AI analysis of images depends on anomaly detection, but POEs see many different types of contraband, and smugglers adapt the way in which it is concealed; as a result, the context in which OFO operates makes NII less valuable for CBP. Finally, several current and former officials suggested that deploying NII could be very expensive, not only in terms of up-front investments but also in terms of operations and maintenance. Because the physical footprint of some POEs would need to be altered to accommodate new NII – one senior CBP official noted that “every new piece of equipment is actually a new construction project” – resource investments would need to be aligned properly. Some field personnel were skeptical that 100% scanning would result in staff efficiencies given how much judgment by Officers might be required to interpret images, as well as the need for additional secondary inspections.

Given all these limitations, some senior field personnel considered NII “just one tool” among many – along with officer intuition, targeting by the Field Offices, tips, intelligence, and canines. In this

view, as one interviewee put it, NII was “nice to have” but hardly a “need to have”, and universal inspection would not necessarily be more valuable than the current risk-based system in preventing contraband. In this view, a superior strategy would be to deepen the current risk-based approach by requiring greater investments in security and validated supply chain data from CTPAT members – ultimately creating what one interviewee termed “a CTPAT on steroids.” (See [next sub-section](#).)

Representatives of The Trade were not inherently hostile to the idea of much more extensive NII in the maritime environment, as long as it did not slow down the process of unloading containers from oceangoing vessels. With this concern in mind, several interviewees inside and outside CBP argued that scanning and adjudication of images would need to be “near-instantaneous” to avoid creating delays. One senior manager at a foreign seaport emphasized that there was currently no scanning technology that could be used when the fastest gantry cranes operate without imposing delays (at least with a static supply of prime movers).

All of these points suggest that whether and when scanning should approach 100% depends on mode. The case is stronger for international airmail and express consignment than for seaports, and stronger for the southwest border than the northern border. These facts suggest that CBP should begin with the most obvious targets and then revisit inspection rates as technologies improve. (Specific milestones for scanning and other cargo-related recommendations discussed below can be found in [Appendix 3: Short, medium, and long-term steps on cargo](#)). In the meantime, the notion of a rebuttable presumption that all shipments should be inspected would apply everywhere.

One important step along the way is improvement in the current risk-based system: a steadily rising portion of maritime cargo scanned by CBP to about 10-15% of containers within five years, combined with the higher percentages for truck, passenger cars, and rail shipments on the southwest border to which CBP has already committed. Preclearance at land borders also constitutes an important transitional step during the period when higher resolution, faster NII technology is being developed and deployed. CBP can move toward a superior scanning regime by replacing current RPMs with NII portals that can provide three-dimensional (i.e., rotatable) images of all containers – in other words, scanners considerably superior to the current MEPs – or some sort of “ensemble solution” involving different technologies. Finally, CBP may be able to deploy very high-energy portals that provide adequate resolution in environments with driverless vehicles, such as driverless trucks or fully automated prime movers in seaports. CBP is already learning important lessons from existing initiatives, such as NII at one terminal in the port of Savannah and the broad use of NII for passenger cars and trucks at most POEs on the southwest border.

To be effective, the NII of the future will require even more sophisticated AI to identify anomalies. AIPs would have to be trained on image libraries that allow them to identify a range of contraband, and CBP (or trusted partners) must be able to retrain them as new forms of contraband become a concern and smuggling patterns change. The system must also be able to marry images from scanners with textual (e.g., customs manifest) and contextual (e.g., geolocation) data. As one interviewee put it, “good NII will get at the things we really care about” – whether material is organic versus inorganic, weight discrepancies, prohibited objects without a pre-defined shape, etc. Although not all the necessary technology has been developed, the pace of innovation indicates what will be possible within a decade, especially if CBP articulated its commitment to considerably expand scanning. In other words, such a commitment by CBP would lift the current regime out of

what is potentially a suboptimal equilibrium of low levels of inspection and technological limitations on existing NII.

Importantly, the presumption of inspection applies to small shipments as well as large ones. An in-depth analysis of the information requirements for small packages is beyond the scope of this Report. However, the likely answer resides in combination of the following, all of which are consonant with the larger notions of supply chain transparency, trusted networks, and 100% inspection of shipments:

1. Rethinking (self-reported) monetary value as the basis for exempting certain shipments from normal customs requirements, and thus the establishment of a new *de minimis* regime;
2. Treatment of mail depots receiving international post as another species of POE, including the use of eNose and NII (via a rapid, conveyor belt-type system);
3. Reporting requirements for at least certain types of items (e.g., those from certain locations or containing certain products) that happen to arrive in small packages, as already contemplated (DHS 2024); and
4. Freer use of sanctions, civil penalties, and criminal prosecutions against exporters, freight forwarders, and brokers who repeatedly ship violatory goods, become vectors for smugglers, or participate in schemes to defraud the United States by breaking up large shipments into small one solely to evade reporting requirements. In general, delays imposed by inspections, suspension of licenses to do business, and denial of ability to export to the United States are likely to be more effective than fines. However, more vigorous civil investigations – with CBP having appropriate authority to conduct these investigations – are also necessary to create the proper deterrent.
5. Easier disposal of violatory shipments, such as the application of the Junker Provision (19 U.S. Code § 1612) to *de minimis*.

#### **AN ECOSYSTEM OF TRUST**

A trusted networks approach should be the logical outgrowth of deeper partnership with The Trade, in which firms (a) guarantee the security of their operations and (b) make their supply chains completely transparent by furnishing much earlier and more comprehensive information about shipments (and their inputs). Outside of trusted networks, there should be comprehensive and near-universal inspection of all goods. Inside trusted networks, only the occasional random inspection and targeting-based scrutiny would occur, and the latter would normally be done in collaboration with trusted partners.

Gradually, the requirements for CTPAT should become the floor for shippers. Trusted trader programs, which currently are predicated on individual company status, should gradually give way to trusted networks that function on manufacturer-shipper-importer history of security and compliance. In other words, participants in trusted networks themselves will be curated by data analytics. Ultimately, trusted status on the land border will permit pre-clearance at the factory gate supported by “security corridors” involving driverless vehicles, drone surveillance, and next-generation container seals. In the maritime environment, trusted status would involve preclearance for shipments at the (foreign) loading dock.

With respect to foreign terminal operators at trusted ports, CBP would effectively be deputizing foreign partners to conduct scanning on its behalf. For that to occur, trusted foreign ports would have to meet certain criteria, including:

- Capacity and willingness to inspect (usually via NII) 100% of U.S.-bound cargo to U.S.-defined standards and share relevant readings with CBP as necessary;
- Adequate vetting and training of personnel involved in port operations and in anomaly detection (with U.S. assistance where necessary);
- A secure physical port environment; and
- Government authorities with whom the United States can reach an acceptable security understanding when it comes to conducting verification and validation.

As a number of foreign ports already exceed U.S. levels on some of these dimensions (Japan with respect to physical port security, King Abdullah Port in Saudi Arabia with respect to inspection capacity, etc.) It is not difficult to imagine that specific terminals at a number of large ports – Rotterdam, Antwerp, Hamburg, Singapore, Tokyo, Dubai, Abu Dhabi, etc. – could qualify in short order for trusted status. Some would be active partners in efforts to secure the GSS, through everything from reciprocal verifications to joint red-teaming exercises. There are also certain countries that are not realistic vectors for contraband and thus might enter the trusted network with lower requirements than CBP would normally enforce (e.g., Iceland or Australia).

In interviews, senior current and former CBP officials consistently expressed trepidation about the prospect of relying on other entities to conduct inspections. The most salient concerns included: the possibility of tampering with shipments after inspection, the unwillingness of foreign governments to conduct inspections or permit CBP Officers to verify what ports and shippers are doing, differences in standards between foreign (or private sector) scanning, and potential corruption abroad. All of these concerns are valid, but none of them constitutes a fundamental challenge to the creation of trusted networks. Rather, they highlight the importance of CBP’s adequately setting standards for any participants in a trusted network, such as foreign (often private) seaport terminal operators and large shippers. For instance, NII will not always be able to determine with certainty or near-certainty whether information and representations about a shipment match the image of its contents; trusted foreign partners will need to set the threshold for matches and decide when further inspection is necessary. In addition, all entities in a trusted network would be annually re-vetted, and entities that could not or would not reach CBP’s standards would not be considered trusted. Again, however, CBP must be flexible not only in the technology that trusted partners will use but also in the mechanics of verification. For instance, CBP must be prepared to come up with clever solutions for validation in places where its personnel cannot easily travel (e.g., certain areas of Mexico) and be willing to employ contractors that can provide the necessary assurances if needed.

Most countries are unlikely *ever* to qualify for the sort of trusted network described here; China is the most obvious example. Maritime shipments from such locations would thus be subject to CBP inspection, unless they first passed through another trusted partner that inspected them to CBP’s specifications (e.g., a trusted foreign seaport, including one in Canada or Mexico, or – in some theoretical future scenario – on a ship that has developed appropriate on-board scanning technologies which meet CBP specifications).

Interviews with foreign customs officials suggest that CBP would not be alone in an effort to secure the GSS by building trusted networks. As one example, Dutch Customs has already recognized the need to shift away from a risk-oriented approach to “100% inspections based on state-of-the-art technology” and believes that elements of this approach are “already both feasible and operational at the main ports such as the port of Rotterdam and Schiphol Airport” (Heijmann et al. 2020: 134;

see also *Customs Netherlands 2017, Customs 2020*). The expectation is that other countries would follow suit.

The creation – under U.S. leadership and impetus – of a global system of vetted seaports would likely affect the flow of containerized cargo globally. Seaports that became trusted partners would be advantaged as transshipment hubs. Access to a trusted local port for firms seeking to export directly to the United States could even influence the location decisions for some investors in manufacturing plants, which would in turn become part of the trusted network. The result would be, in the words of one foreign interviewee, “an ecosystem of trust” that gradually expanded in size, scope, and intensity of information exchange.

#### **FULL SUPPLY CHAIN TRANSPARENCY**

Effective border management in the future hinges on full visibility into firms’ foreign supply chains. Although these new requirements for information sharing will need to be mandated by the government, CBP should work closely with the private sector in determining the timing and sequencing of implementation; firms must be given adequate notice in order to reengineer their systems and determine what information they must collect from their own suppliers. Furthermore, firms must feel confident that CBP’s new requirements will be, as nearly as practicable, definitive and unlikely to change. The ultimate “deal” with The Trade involves complete transparency in supply chains – from soup to nuts – in exchange for expedited processing that keeps the system running at its current scale and pace, and pre-departure clearance all the way to final destination becomes the explicit benefit.

As with the rebuttable presumption of inspection, this regulatory model shifts the burden of proof to the importer. The private sector should have a role in the regulatory process akin to the role it plays in the financial system with know your customer (KYC) and suspicious activity report (SAR) requirements and to its affirmative obligation to establish compliance in the UFLPA. One result would be the creation of new types of fiduciaries, with CBP overseeing verification of supply chains but not necessarily directly inspecting supply lines and facilities. For instance, customs brokers should not function in the traditional manner of data entry specialists or fixers but rather operate as fiduciaries for small- and medium-sized enterprises within the trusted network, allowing such firms to qualify for the expedited handling afforded larger enterprises. Equally important for this new system is the grant of civil investigative authority to CBP regarding trade violations, to ensure that such violations receive appropriate attention.

The notion of full supply chain transparency is not new. CBP has already imposed similar schemes in agriculture (through the National Agriculture Release Program, or NARP) and pharmaceuticals; Stage VII implementation of the Lacey Act comprehends a similar approach. CBP has also moved toward insisting on greater supply chain transparency, in concert with the private sector, in certain industries threatened with unfair foreign trade practices (e.g., solar panels). Finally, the UFLPA set a new standard for supply chain transparency requirements, especially in manufacturing and clothing. Border management in the future extends this approach across the board. Ultimately, CBP must be able to know to a moral certainty where a particular fish has been caught, a diamond mined, or an aluminum bar smelted, not simply the last one or two steps in the supply chain.

CBP’s movement toward full supply chain transparency should begin with industries in which the following conditions obtain:

- the private sector is amenable or at least not resistant to new regulations along these lines, as typically occurs when American manufacturers face a severe competitive threat from foreign producers (including those engaged in unfair trade practices);
- there is considerable concern about trade violations, including tariff avoidance, intellectual property rights (IPR), or environmental degradation; and
- the industry is already dominated by very large firms, meaning that enforcement of new data requirements does not prejudice the ability of small businesses to engage in international commerce.

Some possible candidates include steel, aluminum, timber and other hardwood products, tires, hydrofluorocarbons, rare earth minerals, and frequently counterfeited apparel (e.g., athletic shoes). The movement toward full supply chain transparency can also be built out by focusing on particular regions where violations occur. The UFLPA is one example; another example might be tropical rainforest areas in which some originating products may be environmentally destructive (e.g., palm oil or beef). Sectors dominated by large firms with curated suppliers (as in the auto industry) may be good candidates for a later phase of expansion. In other words, the new regime of full supply chain transparency across all industries can be built gradually and piecemeal.

New data requirements pose a potentially significant burden to small businesses. As two interviewees pointed out, CBP has explicit obligations not to impose onerous requirements on small enterprise (under the Small Business Regulatory Enforcement Fairness Act, or SBREFA), in addition to the standard economic imperative of avoiding the business consolidation that regulation can produce. In most cases, concerns about regulatory enforcement fairness could be addressed through exceptions for small businesses or other remedial measures (including rebates and assistance to business associations to provide tools and services that allow smaller firms to remain competitive). A path to universal supply chain transparency is thus not impossible, but (as noted above), movement should begin with sectors already dominated by larger firms.

One crucial element of supply chain transparency is the ability of CBP to share data with The Trade. As several interviewees pointed out, the goal of inspections and penalties is not to intercept individual shipments but rather to alter the behavior of private sector actors. In many cases, firms will respond appropriately to information from CBP that their supply chains have been compromised or infiltrated by prohibited items. It is therefore essential that CBP find mechanisms for such bidirectional exchanges of information and expeditiously overcome potential legal hurdles.

### **BETTER DATA AND ANALYTICS**

The new, more robust inspection regime should coexist with a more extensive targeting and anomaly detection apparatus, based on automated rather than artisanal link analysis. Better targeting will be enabled not only by new data – such as detailed information on supply chains – but also better exploitation of existing data and the use of artificial intelligence and federated learning to analyze this data. Ultimately, human analysts should not be the first line in risk-detection and anomaly identification; rather, CBP staff should train targeting AIPs and devote their attention to scrutinizing marginal cases.

Private firms should be better integrated into CBP’s targeting and enforcement efforts, including through a presence at the NTC (albeit with access only to certain types of information relevant to their industry). Although several current and former CBP officials expressed questions about the

mechanics of including private firms, such as liability issues and potential preferential treatment of some companies over others, their inclusion (directly or through business associations) is essential when it comes to compliance with environmental regulations, forced labor prevention, and intellectual property protection. CBP should also continue the highly productive portals it has established to receive tips about trade violations.

Sharing of information should be designed not only for targeting purposes but to enhance efficiency throughout the system. For instance, CBP should use its authorities to effectively mandate the establishment of Port Community Systems at all U.S. seaports and analogous entities at any other large POEs with complex ecosystems.

CBP is, of course, well aware that it lacks certain necessary data elements and is actively endeavoring to obtain more. One recent change is Phase VII Lacey Act implementation in December 2024; another is a series of new requirements being worked out through the interagency process led by the National Security Council staff. Bills on Capitol Hill regarding *de minimis* are also relevant. Even if CBP cannot provide The Trade with a single, definitive and final set of requirements, it should be as clear as possible about what it believes it is likely to need in a steady state in the future, as well as what legacy data elements it no longer needs to collect.

Whatever the limitations of existing data for inbound shipments, by far the biggest gap in CBP's data concerns outbound. Lack of data in turn makes analytical targeting impossible – a much more problematic issue than the lack of physical infrastructure to conduct inspections. Greater attention to outbound is essential for two reasons. First, the United States has become a major source of contraband destined for friendly nations. Examples include illegal drugs (often originating south of the border) smuggled through the United States to Canada and Europe, as well as guns and ammunition destined for the Dominican Republic, Mexico, and other locations. As one senior CBP official at a major U.S. seaport put it, “Canada looks at us the way we look at Colombia.” Second, the ability to monitor and interdict outbound shipments is essential when it comes to sanctions enforcement and control over dual-use technologies – crucial national security issues. Two interviewees noted that outbound smuggling of trade secrets and proprietary material by Chinese researchers working or studying at American institutions is also an issue; joint enforcement efforts between CBP and other government agencies had produced results. Again, information is an important predicate for sustained enforcement actions.

The data necessary for CBP to apply analytical targeting to outbound shipments is already resident in the GSS; CBP just does not have access to that information. Even if the decision is made to continue to withhold such information from CBP, the problem could be solved in one of several ways: (a) by requiring exporting firms to give CBP the requisite information; (b) through partnership between CBP and carriers, who have access to the relevant information; (c) through partnership between CBP and foreign governments, with which manifests have been filed; or (d) by CBP lending its algorithms and computation capacity to the Department of Commerce for the purposes of targeting. In this last scenario, the Department of Commerce would retain control of the data, and CBP would not even see the results of the analysis unless the former chose to share it. This last option, while somewhat cumbersome, could provide the bureaucratically easiest path to a regime that would benefit both agencies.

One final issue with regard to data concerns partnership with The Trade. In the traditional model, customs authorities extract information from the private sector in order to make regulatory or

enforcement decisions. In a trusted network, however, information sharing should be bidirectional. For instance, when it comes to trade violations, firms can use CBP-provided data and analysis to interrogate their own supply chains and correct vulnerabilities. Likewise, if they wish to do so travelers should be able to share their information (through CBP) with other entities that sought to vet them. One interviewee offered the example of Canadian tourists crossing the border to attend large sports events; organizers of those events would benefit from learning which attendees had already been judged to be low risk. Another example concerned CBP's ability to respond to inquiries from large firms about whether online users were real people. Still other examples involved public-private collaboration on biometrics and facial comparison. The larger point is that CBP can find allies by working closely with private firms.

A related issue concerns collaboration with other U.S. government agencies. [As discussed below](#), it is essential that the information CBP collects on firms or people not "leak out" to other agencies inappropriately. However, there are often opportunities for CBP to use its holdings to prevent identity theft in ways that do not compromise privacy. One interviewee offered the example of a very simple exchange of data between CBP and the Social Security Administration that uncovered extensive fraud.

#### **SEAMLESS TRAVEL**

Borders of the future will continue to be responsible for facilitating lawful travel, including tourists, visitors, and people who cross the border daily to visit family, work, or attend school. The main challenge ahead will be rising volumes of passengers alongside more diverse traveler profiles and the development of AI for generating counterfeit documents—and for helping identify them.

As with shipments, inspection of travelers should ultimately be universal (i.e., of all travelers), near-comprehensive (i.e., designed to detect a wide range of contraband), predictable (in terms of time required), swift, and non-redundant. Inspection should happen for 100% of people (including personal vehicles or baggage). Comprehensive screening of travelers hinges on the ability to keep up with the changing threat landscape: special consideration must also be given for the changing risk landscape for people, including falsified documents, biohazards including health risks, and links to organizations that threaten US national security.

Key components of seamless travel include:

- A virtual passport that lives in the cloud and is secure.
- Comprehensive scrutiny of travelers (i.e., bouncing information against all available databases).
- Advanced innovation processed in an automated fashion, touchless, paperless, and a non-intrusive inspection. In the context of international travel, the system should be digitalized and touchless, with facial comparison replacing in-person checks. Authorities must be able to query virtual passports at multiple points, but even if their credentials are in fact pinged multiple times, travelers should *feel* as if they are checked once,.
- Reciprocal single processing of travelers with trusted foreign partners: North America, the United Kingdom, the Netherlands, etc. (Although different visa requirements constitute an obstacle for third country travelers, considerable progress can be made with respect to citizens.)

The result should be apparently seamless transit, with recorded information on both entry and exit being shared between governments. One interviewee noted that the combination of automation,



digitization, facial comparison, and cloud computing should truly revolutionize movement of people through the system: “the sky is the limit if you start from scratch.” This is precisely what CBP should do: reimagine the entire system from first principles with an eye toward new and emerging technologies, rather than simply make incremental improvements.

Significant implementation issues will inevitably attend the creation of a seamless travel system. For instance, there will always be a group of passengers for whom automated facial comparison will not be possible (e.g., children). Another concern is overreliance on a single biometric (such as faces) if people can change their appearance; fingerprints may be better than face photographs in some cases, especially in secondary inspection. More broadly, the same biometric will not work for all people. One implication is that there will remain the need for a fraud-proof travel document as a backup, along the lines of RealID, especially in the transition period to full digitalization.

Finally, the pace of movement toward seamless travel will vary considerably by mode. Travel across the land borders, especially the southwest border, will never be as seamless as air travel; moves toward seamlessness depend on advanced information, a smaller number of fraud-proof documents, and technology that permits facial comparison for passengers in cars. Even in the air domain, [agricultural inspection](#) of passengers and their possession in some POEs (e.g., Hawaii) will prevent anything like a seamless experience.

As with shipments, advanced information on travelers from a large range of sources is crucial for proper adjudications. However, the provision of full information to the government raises several crucial issues of privacy . Until the larger issue of trust between the federal government and American citizens concerned about their privacy is addressed – an issue discussed [below](#) – the optimal solution on advanced data remains unattainable.

Ultimately, seamless travel should include a “processed once” system with trusted international partners. This should be implemented immediately in North America and with other trusted partners as they develop their own biometric entry and exit systems (see Verdery 2024 on the European Union).

In the meantime, a second-best system combines expanded vetted traveler programs; expanded watchlists for international criminals; better data analytics; continued movement toward facial comparison systems in all travel modes; partnerships with trusted foreign governments that avoid redundant inspections (e.g., expanding passenger preclearance to London airports); and closer cooperation between airport authorities, CBP, TSA, and airlines to minimize the number of times people and their belongings are inspected.

#### **PANDEMIC MANAGEMENT AND SYSTEMIC RISK**

With respect to public health, the central approach of the new regime should extend the principle of moving inspection away from the POEs themselves. This approach prevents not only delays but also the crowding and chaos that actually undermine pandemic control efforts. It may be helpful to have the capability for health screening and even quarantining mechanisms for a small number of travelers during the very beginning of a pandemic, as well as a small amount of random sampling to monitor trends and help establish the true infection fatality rate (IFR). In addition, in the case of familiar pathogens, virus-detection canines and rapid testing could also be used at the very early stages. However, most of the activity should not take place at POEs. U.S. policymakers should not regard the borders as a feasible or appropriate barrier to pandemics. Instead of thinking of an

infected person as equivalent to a “bomb in a box” (implying comprehensive scanning and potential border closures), they should treat it as akin to the way the U.S. treats animal diseases and phytosanitary controls, and (in some situations) a way to collect epidemiological information.

Basic targeting regimes can be extremely valuable for contact tracing and prevention of spread for certain types of diseases originating in well-known hot spots (e.g., Ebola outbreaks). An expansion of Passenger Name Record (PNR) and Advanced Passenger Information (API) data to include knowledge of prior destinations during pandemics is essential for such a regime to work properly, as the Ebola outbreak revealed. Having ports where passenger arrivals are well spaced out, public spaces are well-ventilated, and the foot flow easily controlled would also be beneficial in reducing the spread of aerosolized pathogens. Alongside these architectural developments, contactless travel will also be useful in the event of an outbreak of a harmful virus, as well as the ability to quickly update public health information for passengers and train frontline officials on screening.

Once a pandemic is underway, digital health credentials should become part of a potential traveler’s electronic passport. However, the existence of digital health credentials does not imply that border authorities should have full access to citizens’ health information. As discussed in [the next section](#), measures must be in place to protect privacy, to allow citizens to choose what information they share, and to instill citizen trust in broader public health surveillance. Having access to (de-identified) health information would give governments the option to flex up or flex down testing and vaccination requirements as new variants of pathogens emerge or resurge. Again, this information should not normally be collected at the border but rather in society as a whole and then used to determine border management strategies.

One crucial lesson from COVID is that dealing with a pandemic by allowing goods to flow but not permitting international travel was a misguided approach. In the future, CBP and its peer organizations must argue vigorously against unreflective shutdowns or border closures. Full-fledged closure of borders at such a stage is an ineffective and costly containment strategy. It is largely useless once a virus is already circulating domestically and unlikely to be effective even at the early stages of a pandemic for respiratory diseases with a typical latency period and low lethality. Rather, domestic epidemiological surveillance should form the backbone of a data-driven approach to ongoing pandemics. Even short-term closures, interviewees noted, are likely to be very problematic in the context of a pandemic, because reopening afterward will be so difficult. As one interviewee put it, “shutting the whole world down” is destined to be an overreaction, and “pure bans and pure mandates never work” because there are “just too many exceptions to every damn rule.” Rather, adopting a risk-mitigation and person-centered approach from the start of a pandemic is essential.

Foreign experts noted that the United States was both slower in shifting to a person-specific approach to border management and also slower to reopen. Because the United States has such pronounced influence globally, its pandemic strategies may set the tone. But once other countries follow suit, the United States may in turn find itself constrained by early choices. For this reason, having adequate plans in place – both nationally and international – for how to handle a future pandemic is essential. The ideal would be an organized international framework. A second-best option would be regional standards that allow for interoperability between different regimes.

Several interviewees expressed concern that the relationship between entities within DHS and the Centers for Disease Control and Prevention (CDC) remain imperfect and “not streamlined”. (One

described it as “totally broken”). Although there used to be public health officials at the land border and airports, and health concerns were historically a major element of immigration policy, “HHS will do anything to stay away from POEs.” Key elements of policymaking, policy execution at the border (including the circumstances under which public health officials would be deployed at POEs and how they would interact with CBP Officers), and communication with the public are all opportunities for further discussion and improvement. The importance of this relationship extends well beyond the U.S. government to partnership with health officials around the world.

Finally, three interviewees noted the fact that COVID policies have “poisoned the well” when it comes to public trust. Government policies were contentious, politicized, and (in retrospect) an overreaction. This experience will make it more difficult to manage the next pandemic, especially in the absence of a clear plan and better data on IFRs. Therefore, CBP’s contingency planning process must include not only other government agencies but also a broad array of stakeholders.

Beyond pandemics specifically, the most important element of planning for future events is adequate information and analytical capacity. For instance, advanced information about shipments and full supply-chain transparency are useful not only in preventing disruptions in the global supply system but also in forensic analysis after a disruption (Flynn 2020). Advanced information on passengers is crucial not only to thwarting terrorist attacks but also to understanding whether other malefactors may be moving through the system, as well as identifying specific points of vulnerability following law enforcement action.

#### **ADDRESSING IRREGULAR MIGRATION**

Ports have played an increasingly vital role in migration management over the last three years, amid rising levels of irregular migration and new policy initiatives to manage irregular flows. The use of CBP One, nationality-specific parole programs, and family unification programs all seek to disincentivize arrivals between ports of entry and facilitate orderly, safe, and managed migration. These programs have been paramount in shifting migration flows to ports of entry and providing options for migration beyond expensive, arduous, and often dangerous journeys. For example, in FY 2022 just 4 percent of arrivals to the Southwest border presented themselves at a port of entry; in FY 2024 arrivals to ports rose to 28 percent. Still, these programs often approach the challenge of unexpected arrivals and function as a scheduling tool, rather than a holistic measure to screen potential arrivals’ immigration and asylum claims and manage their means of entry.

This shift towards asylum management in ports of entry is already impacting the immigration pressures on border officials at ports of entry. For CBP One, each day there are 1,450 available appointments across eight ports of entry, and migrants using the app register by submitting their biometric information and apply for an appointment through their registration. OFO receives the information for daily appointments and the pre-vetting and screening are similar to regular travel, such as checking for national security threats. Similarly, those who have an accepted application through the Cuban, Haitian, Nicaraguan, and Venezuelan parole program and are authorized for travel pre-submit their biometric information through the CBP One app and are checked upon arrival to an interior airport. Future immigration intentions of migrants, for example, if they intend to apply for asylum, are not currently a part of the screening and vetting process for these programs; CBP One can be leveraged for this purpose.

Immigration is highly politicized and it is difficult to predict how the choices made by future administrations and Congress will filter down to the operational level. Nonetheless, there are some

clear trends in the direction of travel across the political spectrum and more globally that will have ramifications for CBP. First, the coming decade will likely see growing restrictions on asylum between ports of entry thus placing greater pressure on POEs. Second, migration and protection options will be brought closer to people's homes or regions of displacement (including by building asylum capacity in regions of origin). And finally, opportunities will expand for digital and physical infrastructure that screen migrants for potential pathways to multiple countries, and ideally shift migrants from irregular to regular channels and from (mis)use of the asylum route to labor pathways.

Many of the building blocks for this future are in their nascent stages. For example, Safe Mobility Offices (SMOs) in Colombia, Costa Rica, Ecuador and Guatemala have largely processed individuals for refugee resettlement, but their goal is to refer eligible populations for other pathways, including labor and family unification, in multiple countries (screening for some pathways to Canada and Spain is available but numbers are low).

In the future, the Safe Mobility Initiative and the expansion of the CBP One app could expand opportunities to pre-screen for pathways, including asylum (which is not currently possible) as well as family unification or employment. It will also shift most applications and screening processes online. At SMOs and in other trusted countries meanwhile, there could be a case for USCIS details to conduct fear screening at trusted transit points to determine if someone would be eligible to apply for asylum earlier in their journey. CBP One could be used in partnership with SMOs to schedule an appointment and collect information beyond biometrics to include reasons for migration (i.e., protection, employment, and family unification).

Ultimately this would shift arrivals away from land ports to airports and reduce the scale and likelihood of spontaneous arrivals between ports. Many interviewees noted that land ports will likely continue to play a role in migration and may have to handle a small case load of irregular arrivals, meaning well-functioning asylum and return systems are needed as well as the proper infrastructure and workforce to meet those needs. However, the future vision imagines migration claims happening from further away, making an interior airport the last stop on the journey, rather than the first step in an immigration claim. The right to territorial asylum would remain as a last resort, not the only viable option.

#### **BRINGING IT ALL TOGETHER**

The new vision of ports of entry entails not only policy change but also conceptual shifts. The first column of Table 1 (below) lists features of border management; the second column describes the current approach in telegraphic form; and the third column offers a synopsis of the vision proposed here.

As noted above, CBP has experimented in some form or fashion with elements of the new approach, and some changes actually represent a deepening and expansion of existing approaches; as one interviewee put it (echoing similar comments by several other interviewees), "almost all of the elements are there, they just have to be brought out in a unified way." In other words, one salient difference between CBP's incremental improvement on current practices and the vision recommended here is a clear, crisp, definitive articulation of where the agency believes things should end up. This end-state is particularly important to articulate with respect to seamless travel, privacy, supply chain transparency, and cargo inspection.



**Table 1: Strategic Shifts in POEs of the Future**

	<b>Current paradigm</b>	<b>Future paradigm</b>
Mission priorities	CT is presented as the most important of CBP’s missions and remain the main focus of NTC efforts; illegal immigration attracts much of the rest of senior managers’ attention	Rebalancing among national security missions; acknowledgement that countering trade violations and conventional smuggling are a growing and necessary a part of CBP’s activities and mission
CBP’s role in the economy	CBP facilitates lawful trade and travel, which contribute to economic growth	CBP enforces a managed trade regime, thus contributing to national economic security
Privacy	Government is limited in the information it can use to assess risk because of fear of abuse by the state	Government has much broader access to information but establishes credible mechanisms to ensure that data will not be leaked or misused
Data collection and retention during transit	CBP holds and manages massive amounts of PII but data is rarely updated during transit	Travelers share data as needed while passing through the system, normally maintaining control of most of their PII
Targeting (both people and cargo)	Incomplete exploitation of existing data; decent data holdings; reasonably sophisticated algorithms	Full exploitation of existing data, plus AI-enhanced targeting based on much broader data holdings; full fusion of passenger and cargo data; ability to pierce confidentiality on beneficial ownership; documentation of effectiveness
Passenger travel	Primary inspection is the default; almost all identity verification is based on documents; travelers encounter multiple queues	Seamless transit through system based on facial comparison and electronic identity documents; significant reduction in staffing through automation
Irregular migration	Asylum claims at POEs (or in between on the land border)	Bring migration options closer to would-be migrant’s homes, thus reducing need for risky journeys and producing a better managed system
Pandemic management	Scramble, shutdown travel, close border, etc.	Comprehensive government-wide plan for next pandemic; collection of data necessary to manage pandemic early on; digital health certificates voluntarily uploaded to digital passport; health checks occur before arrival at POE
General posture toward GSS	Partial regulation	Together with foreign partners, full reassertion of state authority
Cargo screening	Highly imperfect and incomplete information on supply chains	Validated, accurate, and comprehensive information on ultimate source of all components in shipment
General posture toward The Trade	Mix of voluntary partnerships (CTPAT), co-created regimes	Private firms surrender extensive data in exchange for facilitation; rebuttable presumption of inspection

	(e.g., ACAS), and contentious regulations	
Information-sharing with private sector	Mainly unidirectional; The Trade must provide CBP with data	More two-way sharing of data with trusted private sector partners, especially on trade violations
Inspection of containerized cargo	“Layered approach”; 100% radiation scanning; very limited scanning for maritime cargo; increasing scanning of passenger cars, trucks, and rail	Universal NII of containerized cargo, air cargo, mail, and passenger vehicles, using new technology and assemblages that may vary by mode and POE
Agent of cargo inspection	Almost exclusively CBP; tiny portion of inspections by foreign governments at behest of CBP	Done by CBP only for shipments outside of trusted networks and occasional verification of trusted networks
Small packages	<i>De minimis</i> exceptions based on stated dollar value	Rethinking of <i>de minimis</i> as a category; 100% NII of small packages
Intra-governmental relations	Often failed attempts at harmonization	CBP has sole authority to place holds; private firms are never asked to provide the same piece of information twice
North America	Fitful attempts at collaborative border management	CBP leads the charge toward full harmonization of data requirements and authorities to permit single entry/exit and “processed once” regime in USMCA

## From here to there: addressing obstacles and building partnerships

Several challenges confront efforts to build the regime sketched out here, from relationships with The Trade to organizational culture within CBP.

### PARTNERSHIP WITH THE TRADE

CBP and The Trade share overlapping but not identical interests. Both sides seek reduced transactions costs, but The Trade has little interest in sharing data that can be used for regulatory purposes and its interest in security is limited to business disruption. Private sector actors generally oppose government measures that introduce delays, force new investments in security, create compliance costs, or yield a more unpredictable regulatory environment. The Trade tends to regard CBP as heavily focused on security and insufficiently cognizant of its needs, even by comparison to peer customs authorities.

However, The Trade is not monolithic; new border management policies will affect different firms differently. Some examples relevant to this Report illustrate the point:

- A new regime that effectively force foreign ports to scan all oceangoing containers destined for the United States would increase costs in the system overall, but it could be a net benefit for terminal operators that charged a fee for scanning services.
- Increased security requirements globally and the creation of a network of trusted maritime ports would benefit those locations that have already made investments in scanning technologies or can do so relatively easily, increasing their market share relative to less security-conscious ports. However, the introduction of totally new security requirements would be most vigorously resisted by those same firms, as their original investments would be rendered redundant.
- Reporting regulations designed to increase transparency in supply chains would be beneficial to firms that source within North America or Europe, where much of that information is already collected and reliable, but it is likely to be resisted by firms that sourced primarily from many less developed countries or China. On the other hand, if regulations requiring information on supply chains that was not already collected were (a) introduced, (b) poorly enforced in China, and (c) rigorously enforced in other locations, they would have the opposite effect on firms' relative competitiveness.

As a result of this heterogeneity, it is possible for CBP and other customs agencies to develop new, apparently more intrusive rules that still enjoy the support of segments of The Trade.

CBP can also reduce resistance to mandates, even those potentially burdensome on their face, if new requirements (1) affect all firms similarly and (2) result in greater systemic efficiency. Hostility from the Trade is also likely to be considerably lower if new regulation is accompanied by regulatory harmonization across countries, the lack of which imposes costs on firms that operate in many countries. As discussed further below, resistance will also be lower if firms are given an appropriate amount of time to implement new regulations and some reassurance that the regulations will not be followed by yet another set of requirements.

When it comes to information fusion, there are unexploited opportunities for engagement with The Trade. Although the requirement to generate new information for regulatory purposes is likely to be met with opposition, there will be less resistance to sharing information that firms already collect – either with CBP or neutral, quasi-governmental entities like Port Community Systems (Sahu et al.



eds. 2023). When CBP mandates the sharing of this operational information by all firms in a particular ecosystem, it effectively solves a collective action problem within the private sector and reduces transactions costs in the system as a whole. Firms that find private information to be a source of competitive advantage may still be inclined to hoard data, but in most cases the efficiency gains outweigh such considerations. Several private sector managers interviewed for this Report emphasized this fact.

Finally, firms often possess information that can be extremely useful for CBP operationally if properly fused with other data. For instance, data on cargo container weight and swing angle during loading – which is often necessary for shippers to collect – could allow AI-based detection of discrepancies between these data and information on the manifest. Likewise, in the international GA environment, pilots have information on aircraft weight and fuel capacity, as well as (digital) logbooks, that is not currently shared with CBP but would be helpful in targeting. Where it is truly impossible to share data, CBP should do its best to capitalize on the potential of federated learning.

These complexities in dealing with The Trade make it imperative for CBP to engage carefully, deeply, and cleverly with potential private sector partners. Without a clear understanding of each firm’s business model, informational needs, and recent investments, CBP cannot possibly design optimal regulations. As two private sector interviewees emphasized, the detail and nuance needed to co-create a better system go well beyond occasional formal consultations with the business community. Rather, they require senior managers in the Commissioner’s Office, OFO, the Office of Trade (OT), and some DHS offices to truly understand The Trade’s needs.

Over the last two decades, CBP has had considerable success developing partnerships with The Trade. Notable examples include: CTPAT, FAST, ACAS, mechanisms for firms whose rivals engage in illegal trade practices (e.g., IPR violations or tariff avoidance) to report those activities, CBP’s and NICB’s partnership with the National Insurance Bureau (CBP1 n.d.); and various specific arrangements and pilot programs with individual terminal operators, shippers, large firms, airlines, cruise ship companies, and others. Some of these partnerships could be fruitfully expanded.

The POE of the Future will require several crucial changes in the relationship with The Trade:

- Harmonization of regulatory requirements on a global basis, led by CBP;
- Sharing of information currently dispersed through the system (especially in the maritime cargo environment);
- Provision by manufacturers (and importers) of new information about their supply chains;
- Increases in NII scanning, especially for oceangoing cargo; and
- New requirements of information for outbound shipments that can be used for targeting.

The first of these would generally be welcomed by The Trade and will increase efficiency throughout the system. Progress here depends in large part on CBP’s diplomatic efforts and – especially with regard to North America – political will. Harmonization of both data requirements and customs authorities will facilitate single-entry processing, with a corresponding reduction in costs. On the land borders, the default for all crossings (people and cargo) should be single-entry. Because governments have different priorities, resist anything that smacks of ceding sovereignty, and display pronounced bureaucratic inertia, negotiating single processing is inevitably challenging and has frequently proven unsuccessful. Again, political will is necessary, which in this case likely

depends on CBP connections to the White House. Review of USMCA represents a natural policy window to place the issue of harmonization on the North American agenda.

The second of these changes essentially represents a solution to a collective action problem within the private sector. One successful example of this approach is the Port Community System, especially that of Abu Dhabi. Because the benefits of information-sharing are considerable and broad-based, such requirements are unlikely to be resisted by the bulk of the private sector.

The third of these changes will be resisted by The Trade and require government fiat. However, private sector objections can be considerably reduced when (1) they are applied evenly and comprehensively across all firms, (2) firms have a reasonable time frame in which to implement the new mandates, including in this case requesting information from their suppliers and suppliers' suppliers to which they do not currently have access; and (3) full implementation creates a predictable environment going forward. Although resisted by The Trade, the 2009 promulgation of the Importer Security Filing and Additional Carrier Requirements (a.k.a., 10+2) generally satisfied these conditions; CBP's biggest error was in beginning the process with a much longer laundry list of data items to be collected, rather than thinking carefully about which ones it truly needed.

By contrast to 10+2, the UFLPA met the first condition, but it did not satisfy the second; firms operating in China that did not have full knowledge of their supply chains were frequently confronted with the need to either risk potential enforcement action or divest altogether. In addition, certain authentication tools, such as fiber in cotton, had not yet been developed that could allow firms to check their compliance or permit CBP to conduct proper inspections. The recently implemented ACAS data requirements likewise did not satisfy the second condition, leading to protests from an industry with which CBP had previously enjoyed a strong partnership. The bottom line is that a mandate for full supply chain transparency would need to be phased in over many years and accompanied by clear mechanisms that allowed CBP to verify the quality and accuracy of the data provided.

The fourth change (scanning) tends to increase costs and will thus be resisted by The Trade. Again, however, increases in inspection can be gradually phased in over many years – perhaps a decade – giving time for technological innovation, adjustments to the layout and physical plant of maritime terminals, and so forth. In addition, a new regime that provided both supply chain transparency and increased NII inspection would allow CBP to meet a central demand from The Trade: pre-departure clearance of shipments within a trusted network. As one interviewee pointed out, such pre-departure clearance promises considerable cost reduction by allowing firms to make more efficient choices about timing of shipments and the physical arrangement or combination of shipments within a container.

One crucial element of this partnership will be flexibility in determining which ports (or shippers) fall within a trusted network. For a considerable expansion of NII scanning in the maritime environment to be done in a collaborative way, CBP will need to be creative in its verification and validation approach. CBP should not surrender its ultimate authority to inspect any shipment or container, nor abandon occasional random inspections even of cargo shipped through the trusted network. However, it should recognize that different port-specific processes and different relationships between law enforcement authorities and The Trade may produce the same overall level of security. In addition, the appropriate standard is not necessarily perfect security but rather than level of security that exists in contexts controlled by CBP. For instance, port facilities and

operations may be more secure in Japan, KSA, UAE, and certain other countries than they are in the United States. CBP must also remain open to the possibility that new technologies or techniques will emerge that allow shippers or terminal operators to become part of a trusted network – for instance, mechanisms for searching and monitoring cargo in transit or at the factory gate rather than at the port itself.

## **TECHNOLOGY**

Full realization of the POE of the Future depends on three technological developments:

- Improvements in NII technology, including not only scanning devices but also the AIPs for anomaly detection;
- Reliable facial comparison technology for automobile passengers and air travelers; and
- Continuing development of sophisticated targeting algorithms using AI.

At present, technologies do not exist that can provide effective, reliable NII scanning that is rapid enough to keep up with POE operations in a maritime environment. It is almost certain, however, that these technologies will be deployable in the field within a decade. The timeline is likely to be considerably shortened if CBP commits to an increase in the portion of cargo to be scanned (by it or trusted partners). Technological development will proceed even more rapidly if CBP requires that AI for anomaly detection be based on open-source code, allowing firms to compete in developing better software. It must also ensure that anomaly detection AIPs simultaneously ingest image and text data (as current MEPs do to some extent) and are reprogrammable to detect new types of contraband. Finally, CBP must find a cybersecure mechanism for networking currently air-gapped (“on prem”) machines to each other and to image libraries in other countries, in order to better train AIs.

Current facial comparison technology – the second challenge – does not permit reliable recognition of passengers in private cars (though it can perform well with respect to the driver), nor does it allow reliable recognition of passengers as they move through the airport. Again, however, such technologies will undoubtedly be developed if private entrepreneurs believe the market will exist. One interviewee pointed out that almost all the technological elements for seamless travel already exist and are already being combined in some locations in the U.S.; some foreign airports have already surpassed the U.S. in this direction. CBP has also deployed contactless travel using facial comparison in other environments, such as with cruise ships.

AI for targeting continues to develop, and CBP is already in conversation with specific vendors that can deliver tested products, and it is reasonable to assume that such technology will continue to improve. CBP can promote technological development by (a) being clear, consistent, and public about its broad specifications and (b) ensuring that vendors produce solutions which can incorporate new types of data as CBP acquires it and be adjustable to changing CBP specs, rather than provide “black box” products. Given the nature of the industry, some degree of no-bid and sole-source contracting is inevitable; however, CBP can also ensure that alternative companies have periodic changes to develop targeting AIs based on CBP data.

Technological innovation is essential not only to improvement in border management but also to productive partnership with The Trade. Innovation in turn depends on the maintenance of neutral competition (e.g., among service providers at seaports) and the prevention of monopolies or oligopolies (as with port terminal operators and major shippers). When ecosystems are complex

and large firms sometimes provide bundled services, simple anti-monopolistic policies may be insufficient to maintain competition. Therefore, CBP must continue to be attentive to the way in which its policies – especially in the maritime cargo environment – are likely to affect technological development; intentional analysis of economic impacts, either internally or by outside contractors, may be helpful.

Technological development is an international game. U.S.-based companies that serve CBP are likely to be able to sell their products abroad. Advanced foreign ports that rely heavily on automation (e.g., Rotterdam) may be particularly appealing markets for products. It is also possible that foreign governments may be able to advance beyond what the United States can do given restrictions on sharing data with potential vendors.

CBP would not be advised to attempt to pick winners and losers in this by making early-stage investments (along In-Q-Tel lines) or preferentially partnering with specific firms in ways that confer overwhelming competitive advantage. As one interviewee put it bluntly: “Do not welcome any one company inside the firewall” to the permanent exclusion of all other firms. On the other hand, CBP can help lead the world in developing a global industry standard for defining risks, requirements, and specifications regarding AI and other systems. Once the standard is set, firms can concentrate on competing to meet it. Ultimately, of course, CBP will have to pick some vendor-partners over others.

With respect to understanding the technology landscape, CBP’s INVNT team is a major step in the right direction. Given the rate at which AI is progressing, however, CBP could still benefit from more proactive surveillance of technology environment in NII scanning and artificial intelligence. Although vendors constantly come to CBP, the agency does not necessarily have an understanding of where each proposal and “experiment” fits into the evolving technology landscape; rather, evaluations are sometimes done at the port level and are essentially reactive to new product development. One important measure for CBP would be to develop a set of “running specs” based on its vision for the Port of the Future. Publicization of its specs would not interfere with the market but rather give firms specific objectives for which to aim, thereby sharing with the private sector with the vision CBP has for technology development. For instance, working through the National Institute of Standards and Technology (NIST) and the White House National Security Council (NSC) staff, CBP could develop a checklist of general requirements for AIs that falls deliberately short of the specificity required for standard setting but nevertheless communicates to the private sector what sorts of things will be required.

Disconnects between customer and producer/internal vendor are not uncommon in technology development and systems design. Successful partnerships recognize that that the situation is a *system* based on past experiences and interactions, changing which will require new approaches from *both* sides. As one interviewee put it cheekily with respect to the relationship with technology vendors, “We need to understand that this is a marriage, not a hook-up”; the vendor and customer should be in constant communication about how to raise the “child” (i.e., the piece of technology). With respect to major partnerships, it may be possible for CBP to draw on successful experiences in other parts of the government, such as the Ash Carter reforms to procurement in the military service branches.

## **PHYSICAL INFRASTRUCTURE AND INVESTMENTS**

The POEs of the future will not look like those now and are unlikely to require large investments in buildings, land, other construction, or staffing at the physical port. Indeed, one senior former official noted that the idea of doing NII on primary inspection at some POEs “holds great promise” for port redesign, even if it will require retrofitting of some existing POEs. The main investments at POEs will come in the form of new NII equipment and associated layout changes. Although in some cases, adding NII will require altering the physical footprint of a port – especially locations of the southwest border with large passenger car volumes, in most cases it will not. Thus, a good deal of new investment will be focused on a second, largely invisible dimension of port infrastructure: advanced information technology, new analytic capacity, and better IT systems. This infrastructure is unlikely to be located at POEs; rather, POEs themselves will be the recipients of the outputs of this infrastructure, in the form of intelligence-driven decisions about inspections.

Several senior CBP officials suggested that CBP should own all of its own POEs, rather than effectively share custody of them with the General Services Administration (GSA). Although appealing in theory, such an approach is likely to be resisted in practice. A second-best strategy would be for CBP to use its political influence to ensure that GSA is a fully responsive partner.

## **INTERNATIONAL PARTNERSHIPS**

In addition to new partnership with The Trade, building out the Port of the Future will require novel international collaborations. This is particularly true within North America and with respect to the development of a system of trusted foreign ports and full realization of the Integrated Cargo Security Strategy (ICSS). For instance, truck drayage operations should be discontinued and long-haul trucking and expedited border crossing on the NARP program model be implemented.

Beyond North America, Borders of the Future also suggests a way to prioritize CBP’s other international activities. CBP has helped lead the way on global frameworks and standards when it comes to international travelers. Post-9/11 it has developed extensive relationships with a range of foreign countries: Canada (on many levels), Mexico (as with the Joint Security Program), information-sharing arrangements with several Gulf states, and collaboration with Five Eyes countries. Historically, CBP has been the source of new customs paradigms, technology, and frameworks globally, working both bilaterally and through existing multinational organizations. For instance, the SAFE framework was introduced by CBP to the World Customs Organization (WCO) a decade ago. Likewise, collaborations with foreign governments on counterterrorism (including the Five Eyes) has been crucial to “pushing the borders out” with respect to travelers.

Building the Port of the Future depends on such trends continuing, through government-to-government negotiations as well as CBP’s direct outreach to The Trade abroad that can in turn bring foreign governments along (as with agricultural requirements). Although these negotiations are time-consuming and protracted – one senior former official described the WCO negotiations as “like watching paint dry” – they are essential. Several interviewees noted that CBP has a unique opportunity to work with the WCO now, given its new leadership.

The approach outlined here also suggests a prioritization of international capacity-building and outreach efforts. For instance, the presence of a land border and the continued vast flows of goods and people across the southwest border make investment in Mexico an essential step. Joint efforts with selected foreign seaports that can become the core of a trusted network for global maritime

trade (such as Singapore, the UAE, Rotterdam, and Antwerp) also suggest priorities for international engagement. Finally, CBP's international leadership will be essential to disseminating through international organizations the standards and practices that permit this regime to function as efficiently as possible, such as shared criteria for being part of a trusted network and shared commitment to supply chain transparency.

Globally, there are “haves” and “have nots” when it comes to security and technology. CBP must take into account the need for capacity-building among partners abroad, especially capacity-building that yields inter-operability. As one interviewee put it, capacity-building investments are about how to “help other countries get to the place where they can become partners”. Doing so require sharing of information, funding, and a flexible approach to collaboration that involves meeting countries where they are. One obstacle to CBP's global outreach is that funding does not come from a single source designed to advance CBP's vision. Rather, it is often variable by region, derives from counternarcotics or counterterrorism budgets at the State Department; CBP rarely if ever taps money from the Department of Defense, including funding controlled by Combatant Commanders.

In some cases, small investments in partners and prospective partners can be extremely valuable. For instance, considerable advancements in partnership can be achieved by the simple digitalization of customs operations and collection of data from other countries (see *inter alia* Hoffman, Rabé and Hartpence 2021, Bancroft Smith 2023, Tan 2022). Such investments facilitate not only security relationships but also trade, given that dwell times are influenced by the sluggishness of customs operations (Hoffman, Rabé and Hartpence 2021; Arvis, Shepherd, and Utoktham 2013).

Collaboration between a more technologically and professionally sophisticated agency and a less developed one can often be a two-way street in ways that are not obvious to non-specialists. Data is one example:

there are no rich and poor countries when it comes to data; there is no government or administration that could not embark on an ambitious policy to use data; there is no customs administration that would not have data, ‘big’ or not, to the extent of its needs. (Mikuriya and Cantens 2020).

Foreign governments often have special contextual knowledge that is extremely useful for targeting, including knowledge about smuggling patterns.

Even trusted partners can have areas of incompetence or lack of expertise, whether these be geographical (as in some EU countries) or by function (e.g., fraudulent documents). For instance, attempted collaboration with Europe remains “a nightmare” because heightened EU privacy requirement led to conflict about PNR data and how long PII can be retained. Europeans also assign PII to shippers as well, which can make collaboration on the cargo side just as problematic as collaboration on travelers. In fact, some interviewees expressed concern that CBP may lose access to special relationships with individual EU member-states because of EU-wide policies.

Because U.S. policy has traditionally been a significant impetus for change in customs rules internationally, we expect that many of our recommendations are also indirectly recommendations for other countries, which should be disseminated by the U.S. through international organizations. In some cases, as with supply chain transparency, developing global norms will considerably facilitate the U.S. government's own operations. In other cases, our recommendations imply U.S.

action to encourage and assist other countries in reaching certain capacity, which in turn makes them more appropriate partners; one example concerns sharing of information on potential international criminals and terrorists. Finally, certain recommendations require explicit buy-in from and cooperation with other countries; one example is the transition to single-processing of passengers, especially in North America and with a few other close partners.

A vision for the future would help CBP prioritize across various international deployments and initiatives. Top priorities for international deployments would include:

- Short-term visits designed to verify data provided by firms on supply chains;
- Validation and verification visits to foreign maritime ports in the trusted network; and
- Capacity-building for key partners, especially Mexico, including support for efforts to professionalize Aduanas.

These activities do not necessarily imply an increase in the number of foreign attaché offices (currently 22). However, the fact remains that it is infeasible for a DHS or ICE representative to faithfully represent CBP's interests; as one interviewee put it, "the bureaucratic incentives and expertise just don't work," and "the worst [situation] is when representatives of other agencies" think they understand CBP's needs but in reality do not. Consequently, expansion in the number of attachés may be necessary. Presumably, much of the shift could come from repurposing the CSI program. In other words, CBP should use its existing footprint abroad to work with foreign port operators. For instance, CBP Officers stationed abroad as part of CSI, IAP, and cargo preclearance programs can help supervise an 'early release' plan to ensure that regulator's entry decision informs the logistics provider upstream packing plan for containers and loading plan for vessels.

## **PRIVACY**

The collection, retention, and use of extensive personal information on travelers that would be required for seamless travel raises elemental privacy considerations. Although many countries (such as Israel, the UAE, and Singapore) have adopted a much less restrictive approach to privacy, CBP continues to contend with a furious and often confused debate over privacy. As one example, the United States is also one of the only developed democracies in the world without a national identity card, which makes identity verification and the matching biographic and biometric information more difficult.

Privacy concerns are partly an issue of perception, framing, and culture, rather than an actual risk of abuse, much less any risk that America will become the surveillance state of dystopian nightmares (Bunnell 2020). However, examples of government overreach in the wake of 9/11 and extensive incidental collection of data without proper empirical justification have soured public opinion toward government collection of personally identifying information (PII). Equally important, the U.S. federal government (though *not* CBP in particular) has proven itself an imperfect custodian of PII, and the government has simply not taken the steps necessary to reassure the public that data breaches, misuse of personal information, and overstepping of boundaries will never happen again. Data breaches and technological insecurity are commonplace in today's digital world, and obtaining public buy-in is essential not only to remedy such insecurity but also to advance Borders of the Future.

When it comes to winning public trust, proper messaging to interest groups and the American people is essential. CBP has not always won this battle in the past. Examples of unnecessarily

challenging rollouts include searches of phones and computers for images, which proved exceedingly low yield compared to the perceptions they created, and (to a lesser extent) facial comparison at airports. Although one interviewee noted that the privacy community now appreciates the “specific use case” of border control (such as facial comparison at primary inspection), trepidation persists about the prospect of CBP-collected data “leaking” out to other government entities, who would then use it inappropriately.

One cultural problem at CBP that must be addressed is what one interviewee described as an “inbred hoarding mentality.” To win and retain public trust, CBP must be prepared to explain why it needs each specific type of data and to regularly justify the continued use and retention of certain types of information, rather than keeping PII “just in case.” CBP should also take steps to involve its Privacy office earlier in conversations about policy and should establish more effective liaison mechanisms in the field with the Privacy Office to ensure timely adjudication. Finally, CBP must preempt predictable arguments that will be made about profiling and privacy by systematically and continuously reaching out to universities, digital privacy experts, and civil liberties groups to listen to their concerns, explain CBP’s decisions prospectively, and justify them subsequently. Moreover, CBP should be ready and willing to incorporate feedback, adjust technologies, and address concerns about bias.

Most of the time, explaining how CBP operates, how its systems work, and why it needs certain data does not compromise its enforcement efforts. In some cases, however, CBP may believe that adversaries could take advantage of certain policies if they were publicly known. Two examples include the precise targeting rules for international travelers and the reasons for rejection from a vetted traveler program. Even in these cases, however, CBP should not automatically assume that the details of its operations cannot be shared. A modest diminution in enforcement effectiveness may still be acceptable if transparency gains CBP public buy-in.

The simple fact that black-letter law gives CBP certain authorities does not mean that such authorities should be used. Decisions to perform certain categories of searches of people and their belongings (such as inspection of personal photographs on cellphones) should involve a clear, conscious cost-benefit calculation by senior leaders at CBP, in which the intangible effect on public confidence of undertaking certain actions should be a major ingredient. In the long run, having the trust of the public is far more important to CBP’s success than occasional enforcement victories.

As CBP moves toward seamless travel, the architecture of the system CBP uses must reflect travelers’ desires and anxieties about privacy – both the rational and sometimes even the irrational. For instance, it may be most appropriate to construct a system that does not treat all passengers alike but rather allows them to buy into fast-track processes to different degrees. For instance, individuals might consent to have their image used for smart gates in perpetuity, but choose not to share any more data, or individuals might elect to only share certain information with the understanding that it will be erased afterwards; likewise, they might elect to share biographic data but not health data – an issue of extreme public sensitivity that became, in the words of one interviewee “a political hot potato.” Understanding travelers’ wishes and distilling them into system specifications are crucial to building and retaining trust. When necessary, CBP must be prepared to “lock it [the data] up tight or delete it.” Because the issue of storage security is so fundamental to public trust, and the technology on data storage is evolving, CBP must remain nimble and continually update systems that protect any data it collects.



A new approach to privacy ultimately hinges on a paradigm shift by society as a whole. But that shift cannot occur without CBP itself becoming more transparent and attentive to public concerns. Most importantly, CBP must ensure that the PII it obtains is never the subject of a data breach and is stored in a way that it cannot be hacked and with safeguards against (1) inappropriate accessing of data by government employees and (2) sharing of data within the government in ways that are not transparent to the individuals who provided that data in the first place. CBP must work out appropriate covenants with the rest of the federal government *before* it collects new data from travelers, in order to ensure that data will not gradually transpire to other parts of the government or be used for purposes other than those for which it was originally surrendered.

One promising path forward would be to model the digital passport on Estonia's national electronic identity (Piperl 2019, Freethink.com 2020, Collins 2022, e-Estonia 2024). This system has many appealing features, including: (a) each required data element is only requested and entered once, (b) data integrity and transactions are secured via blockchain, (c) users retain full ownership and control over their own data, (d) data from different aspects of a person's life (e.g., financial versus health information) are stored in separate clouds to prevent breaches and allow for restrictions on searches, and (e) users receive notifications whenever their PII is accessed by a government official. The only restriction to scaling the system is server size (i.e., computational power), which is hardly an insurmountable barrier in the context of U.S. border enforcement. CBP will obviously need to retain and fuse certain types of PII (e.g., travel history and addresses) for use in targeting, but most of the data that it uses in the course of any given journey as a traveler moves through the system would *not* remain in its hands. One important corollary is that CBP would never have direct access to citizens' health information, even during a pandemic; citizens would retain ultimate control of such information, even though they might have to temporarily demonstrate certain health clearances when traveling.

Whichever model is ultimately chosen, the paramount requirement of any system is protection against data breaches and misuse. Attempted intrusions have been unsuccessful so far, but there will inevitably be more attempts and data breaches in other organizations are common. For the new regime to work, CBP simply cannot afford a mistake.

#### **COORDINATION ACROSS THE U.S. GOVERNMENT**

The facilitation advantages to the new system discussed here erode if other agencies can make independent judgments about when shipments will be inspected. Therefore, the U.S. government must promise firms an integrated single window. The route to this single interface is for CBP to give other agencies access to its data, negotiate with them about the sorts of inspections to be done, and integrate their specifications into its targeting and inspection procedures, and then render judgments (with any disagreements over policy being resolved through the National Security Council Staff's interagency process). Except in extreme national security situations (e.g., a "loose nuke" or outbreaks of hemorrhagic fever), other agencies in the government should cede all authority to conduct inspections of international travelers and shipments to CBP. Along with these changes, the ISF should be amended to take into account the other regulatory concerns from the forty-six agencies with an interest in trade or travel, as well as the new ESG regulatory environment. One interviewee noted that the granting of Cargo Release Authority (CRA) by USDA's PPQ to qualifying CBP Agricultural Specialists is a good example of how to avoid redundant inspections.

When it comes to passengers, coordination with TSA will remain essential, especially in the context of creating a seamless travel experience. Some interviewees also noted that the two agencies could learn from each other. For instance, one senior former official argued that TSA's experience with CLEAR was an object lesson in what to avoid in vetted traveler programs, because the company effectively "tries to compete with TSA" in queue management. Another interviewee noted that TSA has done a better job than CBP at knowing where its workforce is in large operating areas and being able to relocate staff in real-time ("Blue Force Tracker"). Still another interviewee emphasized how effective the collaboration with TSA was in erecting ACAS.

## **POLITICS**

Even more than most agencies, CBP operates in a politically challenging and sometimes capricious environment. Executive priorities can shift significantly – for instance, the Trump Administration focused heavily on human smuggling and illegal immigration, whereas the Biden Administration introduced a new push to prevent fentanyl trafficking – and the agency has sometimes faced imperfectly conceived congressional mandates (e.g., on radiation detection). CBP has also been caught up in contentious debates over immigration policy, a situation made worse by the overt engagement of the National Border Patrol Council in electoral politics, (virtually every official interviewed for this project regretted the union's decision in particular and the politicized context in which CBP operates in general). As one operational example, one interviewee recounted how political atmospherics prevented CBP from adopting a data-driven approach to border crossing card holders (who overwhelmingly did not overstay their visas). At the strategic level, a different interviewee noted that "leadership is so wrapped up about the border and migration that it's hard to get anything else done." In this view, which was widely shared by interviewees, CBP needs to be extricated from "being that close to" political debates about immigration policy.

There is no way to fully insulate CBP from political cross-pressures, even if doing so were appropriate. However, CBP can help protect itself by defining its own clear vision for what border operations should look like one decade hence, articulating a path to achieving that vision, and socializing these conclusions with political stakeholders. Such a vision will also help CBP in the budgetary process, because it should guide resource allocation, inform workforce planning models, and clarify investment priorities.

CBP's current strategies do not allow the organization to provide a comprehensive enough vision for CBP to respond to outside pressures. How can CBP best justify its workforce-related budget requests to the OMB? How much funding should be invested in foreign capacity-building, and in which countries? Why does CBP demand certain types of information from travelers, and what does it do with that information? Does CBP recommend large-scale expansions of POEs on the southwest border when (say) a new stimulus package or infrastructure bill is approved? What percentage of maritime cargo should be inspected, and why should that percentage be different from the percentage inspected at land POEs? A true vision of the future would allow CBP to respond immediately and coherently to all such questions, rather than in an improvisational, tactical, or ad hoc fashion.

Such rebalancing involves a conceptual shift in CBP's mission. In the past CBP has perceived and described its economic role in terms of facilitating trade and (to a much lesser extent) collecting revenue. As tariffs and other measures designed to encouraging reshoring of American

manufacturing expand, CBP will effectively become a crucial instrument of American industrial policy. That fact creates new pressures on CBP, but it also gives it the opportunity to take a seat at the table in high-level discussions about important decisions on international economic policy.

Communicating CBP's direction and framing its mission is a politically vertiginous exercise for any leader. The challenge is even greater for an individual in a bureaucratically precarious position, including officials in an Acting (or "Performing the Duties of") role. A Senate-confirmed Commissioner with independent political connections to the White House and the Hill would be much better positioned to execute the necessary changes in CBP's orientation, operations, and self-presentation.

### **A CBP OF THE FUTURE**

The new regime has important organizational implications for CBP. Likewise, because the new regime entails new types of partnerships with international travelers, The Trade, and foreign governments, it may require some measure of cultural change within CBP. Ultimately, the POEs of the future will be best served by what one senior former official called "the CBP of the Future."

#### Rebalancing priorities

National security will always be a core element of CBP's mission and operations, and CT is inevitably an important element of national security. Unsurprisingly, much of CBP's effort over the last two decades – from radiation scanning to targeting algorithms to the Container Security Initiative – has focused on counterterrorism. The threat from terrorism has not gone away. In recent years, however, it has been effectively managed through a combination of military campaigns abroad, CBP's success in "pushing the borders out," and the deployment of new technologies at the border. At the same time, other priorities have emerged – both within the national security mission and with CBP's other mission sets. This change does not mean CBP can stop dedicating resources to CT; rather, it means that CBP must take on new tasks while still continuing to deliver on CT.

The proper framing, therefore, is not that national security concerns – or CT concerns in specific – deserve less attention but rather that the specific threats continue to evolve. In particular, national security includes the actions of state-sponsored organizations or nation-states themselves, and it includes activity designed to disrupt normal life or government operations as much as acts aimed at causing mass casualties. It also includes non-proliferation and sanctions enforcement, both of which incorporate outbound shipments. In some cases, these public safety concerns overlap with national economic security, as in the case of high tech and even trade enforcement.

As noted above, many senior current and former officials pointed out that undocumented immigration continues to claim a vastly disproportionate share of top-level attention. Again, the proper CBP response is not to disregard or denigrate CBP's immigration enforcement mission on the southwest border but rather to emphasize the importance of POE operations, including how customs operations at the POEs are linked to national economic security. This rhetorical framing, which includes educating key actors on what CBP actually does, involves Congress almost as much as it does the White House.

#### Workforce planning

As the POEs of the future emerge and automation proceeds, CBP's staffing requirements will eventually shift away from Officers at the POEs toward systems designers, computer

programmers, and intelligence analysts. Although there may come a time in the next decade when these functions can also be partly automated, thereby resolving current labor market bottlenecks, individuals in these fields are currently in short supply. The process of external recruitment and internal production of such staff must begin immediately if the rest of the agenda for POEs of the future is to be implemented on a reasonable schedule.

Given the labor market for certain skills, it is essential that CBP develop specs and standards as soon as possible, in order to be in a position to recruit people to develop the necessary systems. CBP can use this opportunity to up-skill the workforce they already have by providing training opportunities in the skills necessary for the ports of the future. Traditional pipelines for CBP such as law enforcement or border communities could invest in educational opportunities for data analytics, computer science, and other programs to ensure that these jobs remain fillable and available to communities that often depend on them.

As CBP ramps up for systems modernization, it must avoid reliance on contractors who subsequently disappear. CBP should also begin to explore partnerships with the private sector in order to get the right data scientists, computer scientists, programmers, and analysts. In addition, CBP will need to invest in attracting personnel with skill in managing complex public-private partnerships and retraining existing employees to play that role.

Another urgent requirement concerns repurposing CBP staff posted abroad. As many interviewees pointed out, CBP must be able to treat CSI and IAP personnel as “ambassadors” for the agency and to use them to validate trusted partners and verify industry claims about supply chains. This shift will likely entail new processes for recruitment of staff posted abroad and retraining of current personnel.

Modernizing the inspection paradigm will considerably alter staffing requirements at CBP (specifically, OFO). Veteran OFO personnel argued vigorously that even an idealized smart border would involve a major role for frontline OFO staff (in both the passenger and cargo environments). Even the most sophisticated targeting apparatus drawing on the most comprehensive data cannot replace Officer intuition, and even the most advanced NII will not replace the need for Officers to conduct some primary inspections at ports. Canines will still be crucial in some areas of operation (AORs) for detecting types of contraband that NII did not pick up; some agriculture inspections require specialized staff at the POEs; and so forth. Equally important, expanded targeting and NII will produce more secondary inspections, especially in the short-to-medium term. Finally, targeted enforcement actions will always take place at the border, requiring a permanent, robust law enforcement presence. For all these reasons, workforce planning models must not assume that full supply chain transparency, expanded NII with superior technology, or seamless travel would necessarily reduce staffing requirements at the POEs over the next five or even ten years. Only in steady state would CBP be able to imagine a significantly different pattern of deployment or workforce size.

A CBP of the Future implies a “CBP Officer of the Future”. Not only will the composition of OFO’s workforce change, the skill sets of front-line Officers will likely also be different. Senior OFO officials emphasize “putting Officers in a position to succeed” and “giving them the tools” to do their (evolving) job effectively. In the future, Officers may need a more sophisticated understanding of NII, different training in interrogation, and the like. Although an inventory of these skills is beyond the scope of this Report, CBP must think through what they are and what implications they have for

recruitment, training, and retraining. The sequencing is crucial, as OFO faces the prospect of a large portion of its personnel being eligible for retirement in less than four years. Planning for ten years out will affect workforce decisions being made now.

### Authorities

Creating the ideal border management regime will also require changes in inspection authorities. At present, import specialists are not sworn law enforcement officials; their status and qualification must change to ensure that trade-related concerns are fully integrated into CBP's mission and activities. One interviewee argued that "stripping investigative resources out of the agency to address trade violations was a major mistake" in retrospect and has badly limited CBP's ability to fulfill its trade mission; others noted the loss of expertise at CBP in this domain. Because of the lack of priority ICE/HSI is forced to assign to trade violations, given the other demands on that agency, CBP will need officials with civil investigative authority on customs-related matters (i.e., 1810s). This change can be effectuated without bureaucratic conflict or confusion by ensuring that ICE continues to exercise criminal jurisdiction, including when civil investigations reveal criminal activity, and criminal cases continue to trump purely civil ones if a conflict between the two arises. However, two interviewees also suggested more aggressive measures to address trade violations, such as assigning a U.S. Attorney to this domain.

A related consideration is that CBP must have and exploit the authorities necessary to impose adequate penalties on bad actors in the system. One interviewee argued that CBP has been "too gentle with the trade community on this subject"; others noted that fines are inadequate to change incentives, especially if they are litigated away, and that the problem was especially acute in the seaport environment where the consequences of having shipped a container with contraband are effectively less severe than at the land POEs. Still other interviewees lamented the fact that CBP – rather than violators – has to "eat the costs" of storing, transporting, and destroying contraband it seizes.

Although a number of managers in the field suggested that CBP should be able to keep the proceeds of the fines it levies, such an approach is fraught with problems of precedent and organizational conflict of interest. Rather, the fine structure needs to be thoroughly reviewed, especially with regard to diversion of in-bond shipments, trade-related violations, and modes in which fines are utterly trivial for the actors involved (e.g., [GA](#)). Even more important is the use of non-financial penalties, such as suspension or denial of licenses, imposed delays, re-exportation of shipments, and the like. The goal of sanctions is to properly align the incentives of the relevant actors *against* indulging in or tolerating misbehavior – whether the actors in question be customs brokers who provide false or incomplete information, freight forwarders that cut corners, shippers that use those sorts of brokers or freight forwarders, cruise lines that hire workers who tend to abscond, fixed-base operators who do not adequately vet their staff, and so forth.

### Data, targeting, and systems

The creation of the National Targeting Center (NTC) was a major accomplishment of the post-9/11 border management regime. However, CBP's targeting apparatus will require a new, comprehensive review to implement the new regime. First, as several interviewees commented, the NTC (and CBP targeting efforts more broadly) do not adequately exploit the information that CBP already possesses. As one interviewee put it, echoing similar comments by other current and former officials, CBP

really needs to improve on the ability to truly analyze and synthesize the inordinate amount of data that it collects in order to make effective decisions regarding the cargo and people crossing the ports of entry.

Second, interviewees overwhelmingly agreed that, at present, CBP's targeting apparatus cannot demonstrate the level of effectiveness necessary to materially alter the amount of inspection

activity at the physical border. In fact, some interviewees suggested that NTC has recently suffered in budgetary discussions from being unable to document its efficacy systematically. Third, the relationship between the NTC and targeting units in the field – which comprise hundreds of analysts – is (in the words of one senior official) “not where it should be.” Fourth, NTC priorities are not necessarily driven by a strategic vision of border management or how best to assist the field; rather it sometimes gets pulled into politically “hot” issues like fentanyl, cryptocurrency, and cyber, and centralized targeting efforts tend to prioritize national security concerns over more common violations.

Finally, as firms surrender increasing amounts of data on their supply chains, the analytical load on the NTC will increase considerably. Analyzing ambiguous images (from NII scanning) sent by trusted partners abroad will further increase that load, as will the need to fuse various sorts of data not currently exploited by CBP. The computational and analytical burden will be even greater with the introduction of seamless travel. Considerable investment will be needed in connectivity, cybersecurity, and analytic capacity. Given the scope of the challenge, it may prove impossible for NTC to scale up sufficiently or develop new AI systems, especially when it comes to analyzing the massive amounts of new supply chain data. Therefore, NTC will likely have to rely on outside vendors and manage them wisely.

Unity of effort in targeting of OFO and OT is essential as trade-related regulations become an increasingly important element of CBP’s role. Staff making adjudications about holds and inspections in the cargo arena should be collocated or in close virtual contact. Even more importantly, targeting systems should be unified, something that will require CBP to rethink some of its information technology structure. Engagement with The Trade should be coordinated from one point at CBP.

Interviewees argued convincingly that little would be gained by relocating NTC bureaucratically. Rather, efforts should focus on changing the NTC’s priorities and on bringing other stakeholders into it. For instance, CBP should find a way to integrate the efforts of private firms that seek to combat tariff avoidance by foreign competitors, victims of intellectual property rights violations, and the like into the NTC.

More broadly, the CBP of the Future must be an intelligence-driven organization. Ensuring this outcome requires closer integration with the IC and emergent thinking on how best to use open-source intelligence. Again, these points suggest the value of revisiting CBP’s much-vaunted targeting apparatus and adapting it to the challenges of the next decade.

#### Organizational culture

Because threats and technology change, sometimes rapidly, CBP must be an agency that can respond nimbly. Such organizational agility has many elements, but three stood out in conversations with current and former officials. One is surveillance of the technology landscape, as manifested by INVNT in the Office of the Commissioner. A second is the notion of a threats center, that essentially applies the same approach to emerging areas of concern, presumably in partnership with other government agencies. A third concerns the notion of continuous improvement, in which senior CBP leaders interrogate organizational practices regularly to ensure the agency adapts. This third element is a signature feature of current OFO leadership, who are attuned to value of lessons from promising private companies that were left behind as technology changed (e.g., Blackberry). One example of adaptation is modernization of the “customer

experience” in both passenger and cargo realms; another concerns collaboration with stakeholders on the ground in implementing new technologies (e.g., facial recognition).

Internal reform within CBP also involves a change in posture toward the rest of the U.S. government. One opportunity is more assertive engagement through White House-led interagency process. Much of the time, CBP is on the tail end of White House initiatives – whether they be efforts to address an epidemic in opiate usage, new immigration restrictions, or collaborative border management in North America – rather than the incubator of clever ideas and forward-leaning proposals.

Another major opportunity concerns North America, where CBP is sometimes perceived as an obstacle to the implementation of sweeping visions for continental economic integration. This perception is unfair, given that the agency has made considerable progress incrementally on so many fronts and also dutifully attempts to implement policies that may have been devised without its input. However, it is also the case that CBP, like any large bureaucracy with well-defined standard operating procedures and a distinctive organizational culture, does tend to resist proposals that would require it to tailor or reinvent its own practices. Ideally, CBP would become the proactive champion of completing the North American agenda, articulating in advance the potential obstacles that current authorities and trade regulations pose to that vision and suggesting how to surmount them.

Cultural change is exceedingly difficult in any organization, especially a very large law enforcement entity that has been deliberately insulated from political penetration. Unlike the Department of Defense and the Department of Justice, there are very few politically appointed positions that have an operational role in the Department of Homeland Security, and only four “Plum Book” positions in CBP itself. However, CBP could consider certain measures designed to facilitate organizational change: more aggressive engagement with the White House-led interagency process, outside training for senior managers on organization change, rotation of promising mid-level managers through other government agencies, hiring of staff directly from The Trade, more effective use of external advisory boards, and so forth. One major opportunity for CBP concerns the North American agenda. CBP would be best served by positioning itself as the principal advocate of regional integration – vigorously embracing the notion of seamless trade with North America, proactively developing policy proposals that will advance this agenda, and bringing them to the White House-led inter-agency process.

One signal cause for optimism is that OFO successfully worked through major organizational redesign and culture change when it was created. OFO combined personnel from three agencies (legacy Customs, the former Immigration and Naturalization Service, and inspectors from the Department of Agriculture). The fusion of these groups into a blue-uniformed force of almost 30,000 Officers and Specialists was a remarkable achievement and suggests the capacity of CBP to effect another transformation.



## Conclusion

Created in the wake of the 9/11 attacks, CBP has proven strikingly successful in securing flows of goods and people without imposing enormous costs on legitimate trade and travel. Through a combination of advanced information, risk segmentation, and partnerships, CBP has demonstrated how customs and immigration agencies can rise to the challenge of globalization.

Globalization, however, continues to evolve, and to remain successful CBP must do so as well. A quarter of the way into the 21<sup>st</sup> century, a new vision of border management is required.

In the cargo domain, this vision consists of:

- A new partnership with The Trade, in which information that is currently stove piped becomes better integrated in order to expedite commerce and prevent major supply chain disruptions, as well as to identify violations, and information is shared bidirectionally between CBP and trusted partners for the purposes of policing supply chains;
- Full visibility into firms' foreign supply chains, with appropriate verification mechanisms to ensure that information ultimately reported to CBP is accurate and appropriate controls to make sure proprietary firm data is protected;
- A more sophisticated, integrated, AI-enabled automated targeting apparatus that can identify potential trade violations using supply chain data, as well as other types of smuggling;
- Considerably expanded non-intrusive inspection (NII) of containerized cargo into the United States, sometimes conducted by trusted partners abroad to CBP's standards, and including the treatment of international airmail as a full-fledged POE, with 100% scanning of entries;
- The creation of trusted networks involving terminal operators and large shippers that deliver greater security, reliability, and resilience throughout the GSS; and
- Bilateral and multilateral efforts to harmonize data requirements and customs authorities, accompanied by a true "inspected once, recorded once" regime within North America, and extending to other trusted partners.

With regard to the movement of people, the ultimate goal should be near-seamless, end-to-end travel that permits passengers to move through the system without the need for multiple interruptions or queues. This approach entails:

- A secure electronic passport that allows for touchless, paperless, automated verification of identity;
- Full deployment of facial comparison systems, with a single fraud-proof identity card as a back-up and as a transitional instrument;
- More extensive advanced and real-time information as travelers move through the system, and the ability to fuse this data, for the purposes of risk assessment;
- A new partnership with the traveling public on privacy, premised on CBP's ability to protect privileged data and to communicate more transparently with the public about its operations; and
- In the case of future pandemics, the voluntary incorporation of up-to-date digital health information into electronic passports, thus removing "inspection" from crowded airports.

This new regime inevitably requires changes in CBP as an organization. These include:

- A rebalancing of priorities that continues CBP's historic CT mission but also attends to rising threats and challenges;

- Planning for a workforce of the Future, in which Officers have the information and technology to execute their mission;
- Obtaining the authorities necessary to police the GSS and punish trade violations;
- Revisiting CBP's well-regarded targeting apparatus, with an eye toward unity of effort and appropriate investment in systems; and
- Continuing efforts by CBP and OFO leadership to become an intelligence-driven organization characterized by continuous improvement.

CBP reinvented border management in the aftermath of 9/11. This Report offers a roadmap for how it might do so again.

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## Appendix 2: Glossary of acronyms and key terms

21CCF	21 <sup>st</sup> Century Customs Framework
9/11	The Al Qaeda terrorist attacks on the United States of September 11, 2001
10+2	Colloquial name for ISF
80/20 rule	The notion that 80% of the problems (or benefit) in a system are attributable to 20% of its constituent elements
ABI	Automated Broker Interface
ABS	American Bureau of Shipping
AC	Assistant Commissioner (CBP)
ACAS	Air Cargo Advance Screening
ACE	Automated Commercial Environment
AD/CVD	Anti-Dumping and Countervailing Duties
Aduanas	Mexican Customs
AEO	Authorized Economic Operators – any party involved in the international movement of goods that has been approved by or on behalf of a national customs administration as complying with WCO or equivalent supply chain security standards
AES	Department of Commerce’s Automated Export System
AGV	Autonomous Guided Vehicles – driverless prime movers (e.g., in Rotterdam)
AI	Artificial intelligence – a computer program or assemblage that attempts to mirror, supplement, or supplant human cognition or intuition
AIP(s)	Artificial Intelligence Program(s)
ALERT	Awareness and Localization of Explosive-Related Threats – a DHS Center of Excellence under S&T
AMOC	Air and Marine Operations Center
AOR	Area of Responsibility
APHIS	USDA’s Animal and Plant Health Inspection Service
API	Advanced Passenger Information
AQI	Agricultural Quarantine Inspection program of USDA’s PPQ and CBP designed to detect and intercept pests and plant diseases
ATF	Bureau of Alcohol, Tobacco, Firearms and Explosives
ATS	Automated Targeting System
ATS-G	Automated Targeting System-Global (an exported version of ATS)
AV	Autonomous vehicle
AWB	Air Waybill
BCR	Border Cargo Release – a Southwest border precursor to NARP
Big Data	Datasets too large to be dealt with by traditional software and normally too complex for all connections within the data to be intuitive to a human
BIEC	Border Interagency Executive Council – a committee that provides policy guidance to enhance coordination among over 50 government agencies with border responsibilities
BIS	Bureau of Industry and Security, the export control arm of the Department of Commerce
Blacklisting	Pre-designation of items or individuals to be denied entry
Bulk cargo	Loose cargo not shipped in containers, such as grains or minerals
Breakbulk cargo	Freight that, due to its size, weight, or shape, cannot be transported in



	standard shipping containers and requires separate, special handling (e.g., very long metal poles or a wind turbine blade)
C1	CBP Commissioner
CBTS	Cross-Border Threat Screening and Supply Chain Defense (CBTS), a DHS S&T Center of Excellence.
CBM	Collaborative Border Management (within North America)
CBP	U.S. Customs and Border Protection
CDC	Centers for Disease Control and Prevention
CEE	CBP's ten industry-focused Centers of Excellence and Expertise
CFR	Case Fatality Rate – the number of individuals who die from a disease divided by the number who are diagnosed with that disease
CFS	Consolidated Freight Station or Container Freight Station – a location in a terminal where stuffing and stripping of containers is conducted
CLEAR	A private identity company that administers a queue-management program in the air passenger environment
Clearlisting	See TTPs/VTPs; whitelisting
CMaaS	Continuous monitoring as a service – a cybersecurity approach
COAC	Commercial Customs Operations Advisory Committee
Collective action problem	A situation in which all actors would be better off cooperating but fail to do so because each faces an individual incentive to exploit the other by defecting – that is, an N-person Prisoner's Dilemma
Consignee	The person or place to which a shipment will be transferred
Consolidator	An entity that combines multiple smaller shipments into a single larger shipment by optimizing container space
COO	Certificate of Origin
Coordination problem	A situation in which all actors would be better off cooperating but may fail to do because the best strategy depends on beliefs about what others will do
COVID 2019	<u>Corona Virus Disease</u> , a novel coronavirus first detected in 2019
CRA	Cargo Release Authority (granted to qualifying CBP Agricultural Specialists by USDA's PPQ)
CRIPT	Cosmic Ray Inspection Passive Tomography – a variant on MST
CSI	Container Security Initiative
CP	Counter-proliferation – that is, efforts to contain material and technology used to make nuclear weapons
CPOTs	Consolidated Priority Organizational Targets – the main TCOs designated by the Department of Justice for takedown
CSAC	DHS S&T's Chemical Security and Analysis Center in Maryland
CT	Counterterrorism
CTPAT	Customs-Trade Partnership Against Terrorism
DDOS	Distributed Denial of Service cyberattack
DEA	Drug Enforcement Administration
DHS	Department of Homeland Security
<i>de minimis</i>	Dollar value below which international shipments do not require customs declaration forms to be filed (raised from \$200 to \$800 by the 2015 TFTEA)
DNI	Director of National Intelligence
DOD	Department of Defense
DOE	Department of Energy
Drawback	A full or partial refund of duties, fees, or internal revenue taxes imposed on

	imported merchandise, paid upon the exportation or destruction of imported merchandise or a valid substitute
DWT	Dead Weight Tonnage
EAC	Executive Assistant Commissioner (CBP)
EAPA	Enforce and Protect Act
E-Commerce	Buying and selling over the Internet
EDI	Electronic Data Exchange
EGIS/eGIS	Enterprise Geospatial Information Services
eNose	Electronic sensing of certain materials (e.g., explosives or drugs)
ESG	Environmental, social, and governance requirements
EU	European Union
Externality	A positive or negative economic spillover in which exchanges between some actors affect other actors not party to the exchange
FAST	Free and Secure Travel program – a vetted traveler program for truck drivers
FAK	Freight of all kinds
FBI	Federal Bureau of Investigation
FBO	Fixed-Base Operator (provider of private services in General Aviation)
Five Eyes	An intelligence collaboration among the United States, the United Kingdom, Canada, Australia, and New Zealand
FNW	Federal Noxious Weed list maintained by USDA
Freight forwarder	A company that serves as an intermediary between transportation companies that import or export goods and the businesses that need them
FTZ	Foreign-Trade Zone
FWS	Department of the Interior’s Fish and Wildlife Service
GA	General Aviation (i.e., small passenger planes)
General cargo	Cargo transported in bags, boxes, crates, drums, or barrels
GHG	Greenhouse gas – gases that contribute to global warming
GIGO	Garbage in, garbage out; the notion that computer programs require good inputs to produce reliable results
Global Entry	Vetted traveler program at U.S. airports
Green trade	Refers to CBP’s strategy of enforcement against environmental trade crimes: illegal logging, wildlife trafficking, violatory fishing, illegal mining, and other violations of environmental laws and regulations, as well as other efforts to reduce GHG emissions in the GSS
GSA	General Services Administration
GSS	Global Supply System; the sum of the multimodal movement of goods around the world
HTSUS	Harmonized Tariff Schedule of the United States
Hyperspectral imaging	NII that analyzes reflected light across multiple wavelengths not visible to the naked eye allowing detection of pollutants, land use, and minerals
IAP	Immigration Advisory Program
IATA	International Air Transport Association
IC	U.S. Intelligence Community
ICAO	International Civil Aviation Organization
ICE	Immigration and Customs Enforcement
ICE/HSI	The Homeland Security Investigations element of OCE
ICS	Incident Command (system)
IED	Improvised explosive device

IFR	Infection Fatality Rate – the number of individuals who die from a disease divided by the number who contract that disease (whether diagnosed or not)
ILA	International Longshoremen’s Association
IMX	Intermodal exchange
INA	CBP’s Office of International Affairs
In bond	The system allowing imported merchandise to enter at one POE without appraisalment or payment of duties and thence be transported by a bonded carrier to another POE (for export) or authorized destination
Industrial policy	Any government effort to alter the decision of private investors in order to encourage economic growth, such as the tactical use of tariffs, the development of business standards, subsidies or tax breaks for research and development, etc. (Note that industrial policy does <i>not</i> necessarily entail price controls or government favoritism toward specific firms.)
INL	State Department Bureau of International Narcotics and Law Enforcement
INVNT	CBP’s Innovation Team in the Office of the Commissioner
IOAD	OFO’s International Operations & Advisory Directorate, in charge of foreign passenger preclearance programs, the JSP, CSI, etc.
IP	Intellectual property
IPC	Interagency Policy Committee (led by the National Security Council staff)
IPGA	International passenger GA
IP	Intellectual property (including branding)
IPPC	International Plant Protection Convention
ISF	Importer Security Filing
ISO	International Organization for Standardization
ISPM	International Standards for Phytosanitary Measures
ISPM 15	ISPM for treating wood packaging materials to curb the spread of plant pests
ISPS	International Ship and Port Facility Security Code
IT	Information technology
ITDS	International Trade Data System
JIT	Just-in-time (as applied to manufacturing or inventory)
JSP	Joint Security Program (air passenger screening collaboration with Mexico)
JTTFs	Joint Terrorism Task Forces (run by the FBI)
Junker Provision	19 U.S. Code § 1612, which allows CBP to dispose of seized merchandise
KCY	Know Your Customer requirements for financial firms
KSA	Kingdom of Saudi Arabia
KST	Known or Suspected Terrorist
Lacey Act of 1900	Main piece of legislation dealing with illegal trade in wildlife, fish, and plants
LEP	Low-Energy Portal – a type of NII
LOLO	Lift-On, Lift-Off cargo
LPR	Legal Permanent Resident
MAU	Marine Admissibility Unit
MEP	Cargo Multi-Energy Portal – a type of NII
MIT	Massachusetts Institute of Technology
ML	Machine learning – a branch of AI that teaches computers to improve at tasks experientially without being explicitly re-programmed each iteration
MPI	Migration Policy Institute
MRA	Mutual Recognition Arrangement/Agreement

MST	Muon scattering tomography – a passive or very low energy cosmic ray-based NII (see CRIPT)
MTSA	Maritime Transportation Security Act of 2002 – <i>inter alia</i> , the U.S. implementation of ISPS
NAFTA	North American Free Trade Agreement
NARP	National Agriculture Release Program
NBACC	National Biodefense Analysis and Countermeasures Center in Maryland
NCTC	National Counterterrorism Center – an office of the DNI responsible for maintaining the TSDB
Nearshoring	The return of economic activity (usually manufacturing) to a country near to, and typically allied with, the home country
NEXUS	Vetted traveler program between United States and Canada
NICB	National Insurance Crime Bureau
NII	Non-Intrusive Inspection (i.e., scanning)
NIST	National Institute of Standards and Technology
NSC	National Security Council of the White House
NSF	National Science Foundation
NSLP	National School Lunch Program
NTC	National Targeting Center
NUSTL	DHS S&T’s National Urban Security Technology Laboratory
NVOCC	Non-Vessel-Operating Common Carrier
NVC	National Vetting Center
OCDETF	Organized Crime Drug Enforcement Task Force, run by the DEA
OFO	CBP’s Office of Field Operations
Operating technology	Digitized systems that control the operations of equipment, <u>not</u> abbreviated here as “OT” to prevent conflation with CBP’s Office of Trade.
OT	CBP’s Office of Trade
PIA	Privacy Impact Assessment
PII	Personally Identified Information
PNR	Passenger Name Record (airline information system)
PSA	Port of Singapore Authority
PCS	Port Community System
POE	Port of entry – an authorized crossing point into a country
PPQ	USDA’s Plant Protection and Quarantine program
Pre√	TSA’s trusted traveler program
Preclearance	The inspection of shipments or travelers in other countries under the assumption that they will not subsequently be reinspected at POEs
Prime mover	The chassis and carriage used to move containers within a seaport terminal
Prisoner’s Dilemma	A situation in which, when two actors are deciding whether to cooperate with one another, both face a dominant strategy to defect – that is, to not cooperate regardless of what each believes the other actor will do
QHSR	Quadrennial Homeland Security Review
R&D	Research and <u>d</u> evelopment
RealID	Standards for the issuance of identity cards (such as drivers’ licenses) that can be used ( <i>inter alia</i> ) to board commercial airline flights; based on the 2005 REAL ID Act; implementation is managed by TSA.
Reshoring	The return of economic activity (usually manufacturing) to a home country, typically as an element of industrial policy

RFID	Radio Frequency Identification
ROLO	Roll-On, Lift-Off cargo
ROOs	Rules of origin
RORO	Roll-On, Roll-Off cargo
ROS	Revised Operating System – a change to RPM settings
RPM(s)	Radiation Portal Monitors
S1	Secretary of Homeland Security
Safe mobility office	A mechanism by which asylum claimants make application for admission outside of the United States
SAFE framework	SAFE Framework of Standards to Secure and Facilitate Global Trade – minimum threshold for what customs organizations should do.
SAFE Port Act	The Security and Accountability for Every Port Act of 2006
S&T	DHS's Directorate of Science and Technology
SAR(s)	Suspicious Activity Report(s) for financial transactions
SBA	Small Business Administration
SBREFA	Small Business Regulatory Enforcement Fairness Act
SENTRI	Secure Electronic Network for Travelers Rapid Inspection – a pre-9/11 vetted traveler program on the U.S.-Mexico land border
SME	Subject-matter expert
SFI	Secure Freight Initiative
SOD	The Drug Enforcement Administration's Special Operations Division
TAMU	Texas A&M University
Targeting	Identification of high-risk entries within the larger flow of goods and people
TCO	Transnational Criminal Organization
TECS	Formerly the Treasury Enforcement Communications System, now only an acronym, TECS is the workhorse system CBP uses for processing travelers.
TEU	Twenty Foot Equivalent Unit (container) – approximately 20' x 8' x 8'
TFTEA	Trade Facilitation and Trade Enforcement Act of 2015
The Trade	A comprehensive term for entities involved in international commerce
TOC	Transnational Organized Crime
TSA	Transportation Security Administration
TSC	Terrorist Screening Center, a multi-agency body led by the FBI
TSDB	Terrorist Screening Database (the “terrorist watch list”)
TSL	DHS S&T's Transportation Security Laboratory, focused on IEDs
TSPs / VSPs	Trusted shipper programs / vetted shipper program
TTPs / VTPs	Trusted traveler programs / Vetted traveler programs
TWIC	Transportation Worker Identification Credential
UAE	United Arab Emirates, which includes the emirates of Dubai and Abu Dhabi
UFLPA	Uyghur Forced Labor Prevention Act
UK	United Kingdom
UN	United Nations
US	United States
USCG	U.S. Coast Guard
USCIS	U.S. Citizenship and Immigration Services
USDA	United States Department of Agriculture
USMCA	Successor agreement to NAFTA (as of July 1, 2020)
USP	U.S. person – a citizen or LPR
USPS	US Postal Service

VAT	Value-Added Tax
VIP	Very Important Person (e.g., a dignitary)
VWP	Visa Waiver Program
Watchlisting	The pre-designation of certain travelers (or items) for greater scrutiny
WCO	World Customs Organization
Whitelisting	See TTPs/VTPs; clearlisting
WMD	Weapon(s) of <u>mass destruction</u> – a term encompassing different types of Devices that tend to create large numbers of casualties (including potential civilian casualties), the use of which is governed by international norms or conventions, such as nuclear, radiological, chemical, and biological weapons
WPM	Wood Packaging Materials
XD	Executive Director (CBP)

### Appendix 3: Short, medium, and long-term steps on cargo

As noted in the body of the report, not all elements of the vision offered here can be put into practice immediately. CBP should imagine different sets of measures that can be taken in the short, medium, and long term. In the short term, efforts should focus on better algorithms, expanded data, full transparency in data management, explication of CBP’s privacy policies, and articulation of a commitment to sanction for violations of privacy regardless of harm. It should immediately move away from primary inspections, multiple checks, redundant inspections, or the collection of redundant or duplicative information. It should begin the transition toward virtual passport with widespread deployment of facial recognition technology around POEs and (in conjunction with TSA) airports.

In the medium term (over the next five years), CBP should focus on increasing inspection rates (especially for maritime cargo), expanding trusted trade programs, creating trusted networks of shippers and ports, supporting the development of new NII technologies, ensuring supply chain transparency, and prioritizing inspections based on harm reduction. Over the long term, trusted traveler and trader programs will disappear as a more robust inspection regime emerges.

The table below offers basic milestones.

	<b>Short-term (Next 3-5 years)</b>	<b>Medium-term (5-10 years)</b>	<b>End state</b>
Trusted networks	“CTPAT on steroids”: members of trusted networks undertake some inspection and provide supply chain data and images	Half of shipments in trusted networks	Most of shipments in trusted networks; continuous improvement within the network
Extent of NII inspection at some point	10-15% maritime; 100% air; 70% truck, 40% rail, 40% passenger cars; investments in physical infrastructure at POEs necessary to accommodate new NII	All maritime containerized cargo outside of trusted networks is inspected; close to 100% in other modes; improved technology replaces most MEPs, LEPs, and RPMs at POEs; all POEs can now accommodate new NII	Approaching 100% for all modes using considerably superior NII technology
Data on shipments	Initial partnership with private sector focused on acquisition of existing data; UFLPA expansion; identification of future data elements (e.g., GHG emissions); new data on <i>de minimis</i> shipments	Partnership with major shippers and private port operators; expansion of data elements (e.g., GHG emissions); expansion of supply chain transparency by sector	Full supply chain transparency for bulk of shipments; significant information on most other shipments
Targeting	Marriage of all “people” and “cargo” data; expanded information;	Enhancement of targeting based on new supply chain data; competitive	Comprehensive use of data from all stages of supply chains

	published transparent standards for targeting contracts; private sector integration into NTC in some sectors (e.g., pharma, IP); marriage of OFO and OT regimes; less focus on CT at NTC	algorithm design and analysis based on principle of neutral competition; significant investment in information systems and computation	
Verification of manifest data	Pilot programs	Most of trusted partners	All trusted partners
CTPAT	CTPAT restructured as “Trusted Trade, Security, and Facilitation Network”, with annual re-certification and modernized benefits	Approximately 50% of containerized cargo is part of a trusted network; CTPAT obsolete	Majority of containerized cargo is part of a trusted network
Staffing	Significant increase in recruitment of IT staff and analysts; extensive contracting of IT and analysis	Full automation of most primary inspection; increase in number of analysts	Full automation of primary inspection in most modes
Foreign partnerships	Checked once, inspected once regime in North America; investment in capacity and professionalism in Mexico; joint standards for validation; establishment of trusted networks	Checked once, inspected once with all trusted partners; investment in capacity outside North America; joint standards for validation	Inspected once for most shipments; further investment in capacity elsewhere in world
International norms and standards	Adoption of supply chain transparency objectives by WCO; harmonization of most authorities and data elements within North America	Adoption of supply chain transparency objectives by WCO; resolution of all outstanding issues in North America (e.g., agriculture)	Adoption of supply chain transparency policies by WCO; harmonization of authorities and data elements with additional partners



## Appendix 4: Scanning...for what?

As noted in the text of the Report, NII will not work equally well on all types of contraband. For instance, even the most primitive X-ray scanners, such as those currently deployed for trucks on the southwest border, can easily find people or live animals inside a container. However, even very sophisticated scanners would not be able to detect certain types of contraband (e.g., honey containing added sugar), and some types of contraband cannot be discovered via any type of inspection. (For instance, the chemical composition of emeralds from Myanmar, which has sometimes been under international sanctions, is indistinguishable from emeralds found in neighboring countries not under sanctions.) In the case of violations of ESG regulations and tariffs, scanning will rarely be effective. As a result, in some cases the vision for the future may represent only a modest adjustment from current practice, and in others, no adjustment at all.

The first column of the table below lists different species of contraband. The second column describes potential detectability – that is, how the contraband in question could theoretically be identified. The third column suggests the approach most consonant with the vision presented in this Report. The final column suggests the step CBP would take in case inspection detects possible contraband (i.e., some form of secondary inspection).

<b>Type of contraband</b>	<b>Detectability</b>	<b>Recommended general strategy</b>	<b>In case of “hits” ...</b>
Unshielded radioactive material	Readily detectable on passive NII	Combination NII (e.g., high-energy X-ray), manifest screening, and anomaly detection AI	Further inspection by non-CBP agencies
Shielded radioactivity	Detectable via active NII and manual inspection	Combination NII (e.g., high-energy X-ray), manifest screening, and anomaly detection AI	Further inspection by non-CBP agencies
Explosives	Detectable via e-Nose, canines, active NII and manual inspection	Combination NII (e.g., high-energy X-ray), manifest screening, and anomaly detection AI	Manual inspection
People	Detectable via e-Nose, canines, active NII and manual inspection	NII	Manual inspection
Illegal drugs (moderate to large shipments)	Detectable via e-Nose, canines, active NII, and manual inspection	Combination NII (e.g., high-energy X-ray), manifest screening, and anomaly detection AI	Manual inspection
Precursor chemicals	Detectable via e-Nose, canines, active NII and manual inspection	Combination NII (e.g., high-energy X-ray), manifest screening, and anomaly detection AI	Manual inspection

Firearms	Detectable via NII and manual inspection	Combination NII (e.g., high-energy X-ray), manifest screening, and anomaly detection AI	Manual inspection
Large-scale bulk cash	Detectable via active NII, canines, e-Nose, and manual inspection	Combination NII (e.g., high-energy X-ray), manifest screening, and anomaly detection AI	Manual inspection
Endangered species	Detectable via active NII and manual inspection	Combination NII (e.g., high-energy X-ray), manifest screening, and anomaly detection AI	Manual inspection
Miscellaneous contraband	Detectable via active NII and manual inspection	Combination NII (e.g., high-energy X-ray), manifest screening, and anomaly detection AI	Manual inspection
Most phytosanitary violations	Sometimes detectable via manual or visual inspection, with further testing	Current strategy + advanced AI; enhanced supply chain transparency	Manual inspection
Other agriculture violations	Detectable via manual or visual inspection	Current strategy + advanced AI; enhanced supply chain transparency	Manual inspection
Hitchhiking pests	Sometimes detectable via manual or visual inspection	Current strategy + advanced AI; enhanced supply chain transparency	Manual inspection
Hazardous chemical material	Sometimes detectable via manual or visual inspection, or e-Nose	Sensors; current strategy + advanced AI; enhanced supply chain transparency	Chemical analysis conducted by CBP
Hazardous biological / infectious material	Sometimes detectable via manual or visual inspection, with further testing	Current strategy	Chemical analysis conduct by another agency
Items mis-manifested to avoid duties	Detectable via active NII (with appropriate analysis) and manual inspection	Combination NII (e.g., high-energy X-ray), manifest screening, and anomaly detection AI	Manual inspection
Items mis-labeled to avoid duties	Not detectable via NII; potentially detectable via manual inspection	Enhanced supply chain transparency	Manual inspection at port or later?
ROO or GHG content violations	Not detectable via NII; potentially detectable via manual inspection	Enhanced supply chain transparency	?

Products using forced labor	Not detectable via NII; potentially detectable via manual inspection	Enhanced supply chain transparency	?
IPR violations	Generally not detectable via NII; potentially detectable via manual inspection	Enhanced supply chain transparency	Manual inspection at port or later
Counterfeit goods	Not detectable via NII; potentially detectable via manual inspection	Enhanced supply chain transparency	Manual inspection at port or later
Suspected dual-use technologies (normally on export)	Not detectable via NII; potentially detectable via manual inspection	Enhanced supply chain transparency; investigations	Manual inspection at port
Goods from sanctioned countries	Not detectable via NII or manual inspection	Enhanced supply chain transparency; investigations	Manual inspection at port or later
Prohibited hardwoods and forest products, provenance disguised	Not detectable via NII or manual inspection; detectable only via chemical analysis	Investigations only	n/a
Some gemstones (e.g., “conflict diamonds”)	Not detectable via NII or manual inspection; detectable only via chemical analysis	Investigations only	n/a
Other gemstones (e.g., emeralds)	Not detectable	n/a	n/a

## Appendix 5: The value of inspections and a harm-reduction paradigm

As noted in the main body of the Report, most current and former CBP officials expressed skepticism that NII would make much of a dent in America’s drug problem. Analyses of illegal drug markets suggest their pessimism is warranted (*inter alia* Caulkins and Kleiman 2018, Caulkins and Reuter 2010, Dobkin et al. 2014, Singleton et al. 2023, Caulkins, Crawford and Reuter 1993, Moeller and Sandberg 2019). Enforcement at the POEs is a reasonable part of an overall drug control strategy, in which CBP (to quote one interviewee) “does its part” along with other government agencies. By itself, however, concerns about drug smuggling would *not* justify the magnitude of the investments in NII involved in universal inspection.

Another major limitation of NII is that it would be of little use in detecting most violations for trade regulations, including tariff avoidance. Such violations are normally only detected – if they can be detected at all – via manual (as with some apparel), chemical (as with Chinese-made tires, honey with sugar added, or produce falsely labeled as organic), or more involved types of inspection. (In many cases, CBP’s CEEs provide the necessary expertise for adjudications.) For this reason, supply chain transparency and validation is essential to enforce trade regulations.

The main value of universal inspection therefore lies in its ability to impede some forms of (mainly non-drug) smuggling: people, endangered species, bulky items (e.g., ivory), explosives, firearms, radioactive materials or weapons, hazardous materials, precursor chemicals, and so forth. NII would also prevent “rip-off loads”, forcing smugglers to rely on deep concealment. Finally, NII could also be of use in detecting hitherto unknown or underemphasized smuggling, thus allowing CBP to adjust its enforcement efforts rapidly in response to changes in policy priorities and types of contraband. NII would be particularly useful if combined with other technologies: biometrics, license plate readers, etc.

### PUTATIVE EFFECTS ON DRUG SMUGGLING

As noted in the body of the Report, stricter enforcement at the POEs through universal NII would not have a significant impact of the harm caused by illegal drug use on the United States, for several reasons. First, America’s lengthy southern maritime and land borders offer alternate smuggling routes for smugglers at only slightly higher costs. Even if effective, enforcement at the border can lead to a reshoring of drug production (e.g., methamphetamine), the development of new “designer” drugs (e.g., MDMA and hallucinogens), and novel delivery mechanisms (as with crack cocaine) that compensate for the temporary lack of availability of certain drugs, as well as technological innovations that reduce long-run prices (e.g., in the production of opiates). Second, crackdowns at the border frequently lead to smuggling of different or more concentrated products that are harder to detect, which not only partially frustrate enforcement but can also increase the variance of purity on the street and thus undermine the public health benefits of drug policies (*per* Alpert et al. 2018). Third, enforcement at the border is unlikely to have a significant, long-term negative effect on drug consumption by increasing prices at the street level. The street price of drugs primarily reflects the risk premium that must be paid to lower-level dealers (for both possible incarceration and potential death at the hands of rival criminals), as well as the other transactions costs involved in buyers meeting sellers in an illegal market. Prices at the border represent only 10-20% of the final price. An increase in the price at the border of 10% thus translates into only a 1-2% increase in the price to consumers, with an even lower long-term change in price as supply curves shift in response to price increases. (See *inter alia* Caulkins, Crawford and Reuter 1993, Moeller

and Sandberg 2019.) This notional calculation is supported by studies of illegal markets that suggest short-term shocks which leave networks intact are unlikely to result in major, long-term disruptions (*inter alia* Bouchard 2007, Soliman 2023, Duxbury et al. 2020).

Many of these findings from the academic literature were echoed by compelling reports from CBP officials. Field personnel, conscious of the inventiveness and adaptability of smugglers, frequently noted how criminal organizations rapidly adjust their strategies in response to CBP's actions, which could vitiate the benefits of universal NII. For instance, one interviewee recounted how, in the week after MEPs were installed at a particular land POE along the southwest border, seizures at that POE dropped to zero but those by the Border Patrol in nearby areas jumped several thousand percent. Another interviewee suggested that TCOs may purchase the same equipment as CBP and then experiment with smuggling tactics that evade detection (e.g., soaking shirts in meth). Still another suggested that, even if the southwest border were secured – both at and between the POEs – drug traffic might simply shift back to the Caribbean.

Continuous tightening of border controls could have short-term effects on price and availability (ONDCP 2001), and if extremely effective they could potentially lead to an enduring (if marginal) increase in price. Because the public health benefits of even small reductions in illegal drug usage are believed to be considerable, a long-term increase in the price of illegal drugs by just a few basis points could justify billions of dollars of expenditure each year. In addition, vigorous interdiction efforts could create short-term supply shortages in some areas that gave policymakers breathing room to craft a more realistic and enduring response to a sudden change in drug consumption. These benefits are undeniably part of the calculation of harm reduction, but (as noted in the body of the Report) are not large enough by themselves to justify a 100% inspection regime.

#### **FRAMEWORK FOR COST-BENEFIT ANALYSIS**

A full analysis of the social benefits from greater inspection -- that is the social harm reduced -- is beyond the scope of this Report. Conceptually, however, harm reduction is a product of three terms:

1. Reduction in flow of contraband as a result of border enforcement measures;
2. Contraband importation as percentage of potential availability (i.e., displacement effects); and
3. Magnitude of social harm owing to the availability of the contraband in question – typically measured by the sum of the following:
  - a. cost of person-years lost (based on cost of a life),
  - b. lost wages from productive person-years lost, and
  - c. costs to the health care system (e.g., from drug use).

This analysis would need to be done separately for each form of contraband detectible through newly deployed inspection technologies. Note that this approach cannot properly quantify the costs of outbound contraband flows, including violations or smuggling of dual-use technologies.

Notionally, the interaction of these three factors is shown in the Table below. Darker shading indicates contraband that is worthy of greater attention.

		Benefit to society of reducing cross-border flow	
		Low	High
High reduction in cross-border flow as a result of increased enforcement at the POEs	Lost flow is difficult or costly to replace from other vectors (or from domestic production)	<i>Example: large ivory shipments, violations of duties</i>	<i>Certain pests? WMD?</i>
	Lost flow is readily replaceable and at low cost by other vectors (or from domestic production)	<i>Example: diverted but genuine Rx</i>	<i>Examples: explosives, precursor chemicals</i>
Low reduction in cross-border flow as a result of increased enforcement at the POEs	Lost flow is difficult or costly to replace from other vectors (or from domestic production)	<i>Example: knock-off handbags</i>	<i>Example: fentanyl, viral samples</i>
	Lost flow is readily replaceable and at low cost by other vectors (or from domestic production)	<i>Example: pirated DVDs</i>	<i>Example: smuggled cannabis</i>

The cost side of the equation would include:

- the expense involved in purchasing, operating, and maintaining scanning equipment and systems over a fixed period;
- minus the savings in staff that accompanied broad deployment of new scanning technologies;
- minus the positive externalities generated by investment in scanning technologies. This last term includes both:
  - general benefits to the economy from investments in new technology that could have “civilian” applications,
  - the profits gained from sales abroad of new scanning equipment.

## **Appendix 6: Additional detail on modes and agricultural trade**

As noted in the body of the Report, the idiosyncrasies of each mode affect implementation. The body of the Report focuses on the main modes – maritime, truck, rail, and air for cargo and commercial passenger airlines when it comes to travelers. However, considerable information about less prominent modes was also collected in the course of the project, and this information is summarized here. For each of these modes, this Appendix provides (1) a background discussion of the idiosyncrasies of the mode, (2) issues specific to the mode related to the general vision described in this report, (3) issues related to outbound inspections, and (4) potential recommendations for CBP to consider. This Appendix also provides modest additional detail on the main modes that is not central to the discussion in the body of the Report.

### **GENERAL AVIATION**

#### Background

General aviation (GA) is a comprehensive term for non-commercial flights that encompasses a hodgepodge of activities involving small aircraft, including aerial work (e.g., crop-dusting or medical flights), recreation (e.g., air sports), and some passenger travel. Our focus here is on one species of GA: international travelers on small, privately-owned planes (IPGA).

IPGA terminals constitute a distinctive ecosystem in several ways. First, Fixed Base Operators (FBOs) generally coordinate most activities (including ground crews and mechanics), often contracting with independent vendors housed in the FBO's building to provide carve-out services (e.g., rental cars). Second, there are other private players specific to IPGA, such as (a) Professional Service Managers not affiliated with FBO, (b) charter companies or handlers, who provide concierge services to passengers, and (c) managers of a secondary market for “deadhead”-style seats on aircraft that would otherwise return empty. Third, conveyance ownership is distinctive. Most aircraft are owned by limited liability corporations (LLCs) rather than large firms, and in a significant minority of cases, ultimate beneficial ownership of the aircraft is unclear to CBP.

Fourth, although no public study of price elasticities exists, inspection constitutes such a tiny fraction of the cost of IPGA that even a much greater set of CBP requirements would not impact on the business model – something not true in the case of ordinary air travel or maritime cargo. Fifth, the government players are different: the Department of Transportation's Federal Aviation Administration (FAA) is the principal regulatory body other than CBP, with other government agencies (TSA, ICE/HSI, DEA, Department of the Interior's Fish and Wildlife Service, FAA inspectors, etc.) normally called in only if CBP warrants doing so.

As in most other modes, information that could be useful for law enforcement purposes often remains sequestered among different actors. For instance, pilots have information on aircraft weight and fuel capacity, service records, and (digital) logbooks; on very small planes, the pilot also typically records the weight of each passenger and her bags. Likewise, the FBOs and Professional Service Managers have information on specialty services requested by passengers. Information on beneficial ownership of conveyances is effectively withheld. In CBP's hands, these different types of data could potentially be useful in detecting anomalies, including the possible presence of contraband or other violations.

Also as in most modes, potential sanctions for violations do not necessarily attach to specific players in a way that properly aligns incentives. For instance, although aircraft and their owners could be punished for violations of safety regulations, they are not legally liable for the misuse of their aircraft by smugglers. Likewise, Professional Service Managers have no fiduciary responsibilities. Finally, FBOs, pilots, and flight attendants are not responsible for reporting criminal activity, even if it is obvious. None of the players, especially FBOs, have any business interest apart from catering to passengers – at least under current penalty structures.

#### Issues specific to IPGA

Processing of travelers by CBP for IPGA is inefficient from a staffing perspective; far more staff are dedicated per passenger than is true in other modes. There is a legitimate social rationale for allowing certain types of individuals to travel internationally apart from the bulk of the population, as with celebrities who would be the subject of unwelcome and inordinate attention from the general public. However, IPGA is primarily a concession accorded by the federal government to high-net-worth individuals and senior managers of certain corporations, as well as the guests of these people – sometimes including public officials with whom they have or are cultivating a relationship.

Because creature comforts on private planes are not necessarily superior to first-class travel, the primary benefits of IPGA are separation from ordinary travelers (beyond what private airline clubs and first-class seating provide), avoidance of TSA-related delays, somewhat more flexible travel schedule, and private processing by CBP. IPGA may also come with additional perquisites provided by the government, such as exemption from certain public health screening and quarantine provisions during the COVID pandemic. Finally, travelers on private planes may be treated with greater politeness and deference by officials travelers on commercial flights, either because Officers (in the words of one CBP Officer) are “starstruck” by the prominence of the traveler or because Officers know that IPGA passengers are likely to be politically connected and thus should be treated with greater care.

Even assuming that these sorts of concessions to VIPs are appropriate, they would not imply greater baseline tolerance for illegal activity (e.g., smuggling or drug use). Rather, level of scrutiny should match actual risk, and sanctions should reflect the seriousness of the violation rather than the status of the traveler. Therefore, assuming IPGA continues, the central question is how to ensure that passengers, crew, baggage, and the conveyance itself receive appropriate scrutiny.

Actual risk posed by IPGA is difficult to verify, given the absence of random secondary inspections that exist in other environments. However, the consensus among CBP personnel is that IPGA travelers and conveyances are generally low risk. For instance, one subject matter expert on IPGA conjectured that travelers and conveyances fell in the range of 10-15 in terms of risk on a hypothetical scale of 0-100, where 50 is the average level of risk.

In terms of scrutiny received, IPGA passengers typically receive *greater* scrutiny than ordinary travelers. For instance, the same SME hypothesized that the degree of scrutiny was about 75 on a hypothetical 0-100 scale. Though impressionistic, this assessment accords with the standard operating procedures in IPGA. All inbound flights are scanned for radiation using hand-held wands; CBP Officers board and visually inspect the interior of every plane; processing of passengers – currently done using a Grabba mobile device – effectively means primary inspection for each traveler; and multiple CBP Officers are on hand to observe disembarkation and passenger



behavior. In terms of the conveyance, IPGA is “not the Wild West” (in the words of one official). Flights into the country are monitored by AMOC and required to land at specific locations, and both screening and inspection of passengers (as described above) are standard.

A separate question is whether minor violations by famous or politically connected IPGA travelers are more likely to be overlooked than they would be in other modes. For instance, would a celebrity whose person, luggage, and conveyance reeked of marijuana be less likely to find himself subjected to secondary screening and detention if he arrived at a GA terminal, rather than on a commercial flight? Given current norms, the answer is likely to be yes. However, conversations with Officers suggest that any impunity enjoyed by IPGA passengers would decline precipitously with the seriousness of the offense. For instance, CBP Officers would not overlook the discovery of guns, concealed shipments of drugs, and other serious contraband.

Distinctive features of IPGA also mean that it is unlikely to be a major vector for most types of smuggling. Because small private aircraft are limited in the weight and volume of contraband they can carry, IPGA is an implausible vehicle for trade violations and many types of illegal drug trafficking, and aircraft make an unappealing option for moving explosives. The sorts of contraband carried by IPGA passengers is likely to be confined to personal use. Although professional smuggling networks could theoretically use IPGA for larger shipments, the likely contraband would be gemstones and high-tech items, rather than shipments of illegal drugs. Consequently, not only is risk likely to be relatively low, the social harm of most smuggling through IPGA is likely to be limited relative to other modes.

All told, therefore, IPGA seems to involve a roughly appropriate level of scrutiny compared to other modes. Although certain violations may be overlooked, the general level of scrutiny does not appear inappropriately low.

One final concern regarding smuggling is whether IPGA creates more opportunities for internal conspiracies. Because postings at GA terminals are considered appealing, Officers may remain in one location for many years. This fact gives them a strong sense of what constitutes suspicious activity, but repeated interactions between Officers and aircraft crew or travelers could also theoretically facilitate corruption. Officers also tend to maintain what one senior CBP official characterized as “cozy” relationships with the FBO. (For instance, they may be permitted to use FBO facilities under certain circumstances.) Finally, in at least some GA facilities, Officers are permitted to bring their personal vehicles onto the tarmac, inside the sterile zone.

In general, checks are in place to ensure professional integrity. For instance, Officers work in pairs when inspecting an airplane. Because the assignment of one Officer to a partner is haphazard, it would be difficult to ensure that two specific individuals were working together at the same time that a particular aircraft arrived. Ordinary oversight of Officers and discussion of IPGA in CBP working groups on internal conspiracies presumably also constitute powerful constraints.

### Outbound

The potential for smuggling certain high-value, small size items (including technologies whose export is controlled or prohibited) raise the question of outbound IPGA. As with inbound, outbound IPGA passengers probably receive appropriate or greater scrutiny than most travelers relative to the risk they pose; however, searches of outbound *planes* are normally based only on intelligence

tips. As with inbound, random checks could confirm the hypothesis that outbound IPGA is truly lower risk.

#### Recommendations for CBP to consider

CBP could *consider* several measures to further impede IPGA from being a problematic vector.

- Empirically test the assumption that inbound and outbound IPGA is indeed lower risk (in the same way that vetted travelers are occasionally subjected to inspection), using a pilot program of random secondary inspections and the (unannounced) random deployment of canine units trained to detect both drugs and contraband.
- Require that the provision to CBP of additional, already extant information held by pilots, crew, and FBOs, especially information on beneficial ownership and logbooks, in order to improve targeting.
- Regularly vet all FBO personnel and others employed by private contractors in the same way as similar personnel in other environments (TWICs). These individuals should also be vetted against DEA case files, as was done at one GA facility.
- Working with ICE/HSI, consider a small, experimental program in which pilots or flight attendants were recruited as CIs, or establish a joint TSA-CBP auxiliary for pilots on private aircraft akin to a much smaller version of the Coast Guard's auxiliary of recreational boaters.
- Issue formal, written guidance to CBP Officers regarding the circumstances under which certain violations by IPGA passengers should be overlooked. The existence of such instructions would insulate Officers in GA terminals from political interference by VIP travelers and allow them to push back against any attempts to encourage them to overlook obvious violations.
- Assign appropriate penalties to aircraft owners, pilots, FBOs, and passengers with an eye toward ensuring that each private actor in the system has an incentive to prevent smuggling. For instance, aircraft owners should be liable if their conveyance is used for smuggling, and both pilots and flight attendants should be required to report patently illegal activities. Given the nature of the mode, penalties like suspension of a passenger's right to be processed at a GA terminal, barring of a passenger from vetted traveler programs, suspension of a pilot's license, grounding of a plane (by tail number), denial of future entry, or withdrawal of certification are likely to be more effective deterrents than fines.
- Require that each private plane flying internationally be outfitted with fixed, tamper-resistant devices (one in the cabin and one in the belly) that can detect radiation and various sorts of contraband, as well as transmit geolocated data along with device readings to CBP. Planes with such equipment in good working order would not be scanned for radiation upon arrival and would not normally be boarded by CBP Officers. If the passengers were also Global Entry members, they would not interact with CBP Officers upon arrival, and both arrival and departure would be seamless.

#### **PRIVATE CARS AND PEDESTRIANS AT THE LAND BORDER**

##### Background

In 2023, there were 45 million pedestrian entries and 96 million passenger vehicle entries – as well as a similar number of exits. This represents a staggering flow of travelers to adjudicate.

##### Implementation issues specific to the mode

One distinctive feature of passenger vehicles concerns rush hour, especially on the southwest border where daily commuters constitute a majority of the traffic. At these peak times, Officers are given very little time to make an adjudication. Finally, CBP receives very little advanced information

on such crossings. Obviously, this combination presents a significant challenge for enforcement actions.

Passenger vehicles are not usually a major vector for serious smuggling, but they are a potential vector for undocumented migration of people who would not fare well in overland crossing routes (e.g., women and children, the elderly, etc.). One particularly difficult instance of such smuggling occurs when one passenger with fraudulent documents rides in a car with a driver and other passengers who all have valid documents.

Expedited processing of travelers in private cars hinges on two things: (1) technological improvements that allow for facial comparison of passengers as well as the driver, and (2) the near-instantaneous processing of information about these individuals. The first technology is not currently available, but it is reasonable to assume that they could be developed and deployed within the next decade if not sooner. The provision of advanced data could be incentivized via rebating for those who provide it and (for trucks) creating a market for crossing times. A digital passport will be helpful in expediting processing even if no advanced information is provided. Finally, x-ray inspection of cars can continue to increase, and the sophistication of the images can be enhanced as technology develops.

One interviewee emphasized the need for CBP to be particularly attentive to marrying different types of data in this mode: license plates, NII, biometrics, etc. This same interviewee also noted that a good deal of effective advanced information is already resident in the system, thanks to the number of cross-border commuters. For instance, a large chunk of the traffic flow on Monday mornings can already be segmented by risk, and could theoretically be directed to different lanes on that basis.

### Outbound

POEs on the southwest border were also a major vector for stolen cars (on outbound), though that issues has been largely address through the sharing of license plate information, and the *hormiga* (small scale, literally “ant-like”) smuggling of firearms and munitions into Mexico. As these examples imply, outbound contraband, especially on the southwest border, remains a concern. As with private cars, outbound has primarily focused on conveyances (stolen cars) and individuals with outstanding warrants. Both have been the subject of effective collaborative efforts within North America.

More systematic outbound inspection is limited by several factors: (1) the lack of advanced information on non-vetted travelers; (2) lack of advanced information on conveyances; (3) lack of accurate targeting algorithms, in part as a result of (1) and (2); and (4) lack of infrastructure for secondary inspections. On the northern border, (4) is readily solved by using Canadian infrastructure, an approach fully compatible with the notion of single entry/exit. On the southwest border, Mexican infrastructure is sometimes less developed, though past collaborations on southbound smuggling of stolen vehicles, bulk cash, firearms demonstrates that there is considerable potential for increased inspections. By contrast, the first three points are not readily solved. However, targeting could potentially be improved through intelligence-sharing, the use of random secondary inspections (conducted by North American partners), and better fusion of existing information on individuals or conveyances. Resolution of the technological issues mentioned above would also improve targeting.

### Recommendations for CBP to consider

- Targeting algorithms should be improved along the lines discussed above.
- Peak pricing models should be explored where possible.
- Private cars and their passengers should be identified and checked once on both the northern and southern borders; there should not be redundant checks by customs and immigration authorities within North America.
- An attempt should be made to identify pedestrians as early as possible through facial recognition (e.g., at the beginning of the line rather than at the actual checkpoint) in order to obtain the equivalent of advanced information than can be used for targeting purposes.
- Pedestrians should be identified and checked once on both the northern and southern borders; there should not be redundant checks by either Canadian or Mexican authorities.

## **CRUISE SHIPS**

### Background

In general, cruise ships are a location where facial comparison technology and advance data show the promise of seamless travel. For instance, the port of Baltimore in Maryland began using facial biometric technology to collect biometrics from cruise passengers debarking at this port. The process is meant to be fast and efficient, taking an average of two seconds with 98% accuracy. As cruise travel resumed after the COVID 19 pandemic, the Port of San Diego became one of the 16 ports to use facial biometric technology for debarkation procedures. (The photo taken upon disembarking is compared to the individual's visa or passport photo to verify their identity; those who wish to opt out can request a manual check by a CBP official.) The biometric process using facial recognition takes approximately two seconds. As a third example, Global Entry members traveling internationally through the St. Louis Airport can use CBP's receipt-less facial kiosks. In general, interviewees indicated that CBP had gone much farther in partnerships with cruise lines than in containerized cargo, particularly with respect to Miami and Everglades.

### Implementation issues specific to the mode

The most problematic element of cruise ship operations noted by interviewees concerned absconding crewmembers. Several interviewees noted the success of the Jacob's Letter program, originally devised at Newark, and related "dialogue" with cruise lines in addressing this problem. Another concern is the lack of a comprehensive requirement for data passengers on some vessels, which would be useful in targeting.

### Recommendations for CBP to consider

CBP should review the penalty structure for cruise ships whose crewmembers abscond.

## **MARITIME CONTAINERIZED CARGO**

### Background

As implied in the body of the Report, several features of oceangoing containerized cargo make for distinctive challenges. The main idiosyncrasies of the mode include:

- The complexity of ecosystem, with a large number of private and public actors.
- Consequent information dispersal, sometimes even in the context of a functioning PCS.
- The array of different types of cargo shipped.
- The heterogeneity of ports. As several interviewees noted, "If you've seen one port, you've seen one port"; by comparison to airports and land POEs, it is difficult to generalize from operations in one seaport to another. Specialty ports abound, from the pure RORO *ferrobuque* between

Mobile, AL and Coatzacoalcos, VC to terminals focusing on general cargo to ports focused on oil and gas.

- In contrast to land and air, maritime borders are crossed well before arrival at the POE, and ships can cross back and forth across the border of the United States or other countries without needing to document that fact. Authorities also shift gradually in the maritime environment, with the USCG involved in international waters, territorial waters, and via the Captain of the Port until a ship docks.
- Related, there are a large number of private marinas and private vessels that regularly cross international boundaries without documentation (including perhaps 10,000 private boats on the Great Lakes alone).
- Lengthy transit for transoceanic trade theoretically provides longer opportunities for inspection in transit, but TEUs are stuffed before departure and stacked in such a way as to make onboard inspection difficult if not impossible. still need to stuff the TEUs before departure
- The current inspections regime does not necessarily offer a facilitation advantage to lower-risk cargo, which is unloaded and stacked in the same way as high-risk cargo; given the way containers are delivered to gantry cranes, they are not and probably can never be stacked on a ship by security level. In addition, TEUs sometimes contain shipments with different levels of risk

#### Implementation issues specific to the mode

Some of the special challenges for CBP in this environment include:

- A small percentage of cargo is inspected.
- Although some seaports have high levels of automation in the loading and unloading of containers, many ports have a long way to go in automating many of their operations.
- Some interviewees suggested that RPMs (and other scanning) should be brought into the process earlier
- Although all containers pass through primary movers and typically dwell in stacks for days, there remains concern from The Trade that inspection as containers were being unloaded could create delays.
- Because shipments that are non-compliant are intercepted, CBP must pay for the cost of warehousing, transporting, and even destroying contraband. Many interviewees suggested that the system of fines and penalties was inadequate to alter business practices. Others noted that CBP in general had been “gentler” or “too gentle” with The Trade in the maritime environment, imposing much less strict penalties than would be imposed if the same violations or contraband were found in a shipment at the southwest border.
- As discussed in the body of the Report, very low inspection rates has long been a concern in this mode.

#### Outbound

Unlike other modes, plenty of infrastructure along with potentially greater availability of technologies and data. Often lengthy dwell time for containers to be shipped or transshipped. It is a potential vector for dual-use technologies and shipments eventually destined (illegally) for countries under sanction. The United States is a source country for crystal meth (to Australia and New Zealand), as well as for drugs to Europe that have been driven up from Mexico. As one interviewee put it, “The Canadians and Japanese look at us [American seaports] as smugglers” and “they think of LA the way we think of Cartagena”.

### Recommendations for CBP to consider

The central recommendations for maritime containerized cargo are discussed in the body of the Report. These include:

- A considerable increase in inspection rates
- The development of trusted partners (major liners, port terminal operators, and foreign port owners) who can deliver scanning.

Other recommendations include:

- Expanded use of Port Community Systems, which are not only valuable in their own right but important for extracting maximum value from automation (see Chu et al. 2018)
- Expansions of outbound inspections.
- A review of trade diversion through Mexico and abuses in the in-bond program since USMCA ROOs were imposed.
- Update the penalty structure.

## **AGRICULTURE**

### Background

“Agricultural products” comprise a wide range of varied shipments across multiple modes: produce crossing into the United States along the southwest border; lumber and wood products entering through the northern border; packaged meats, grains, and honey arriving at seaports; and cut flowers arriving by air. As one interviewee put it, agriculture is a “totally different beast” from most of the general cargo that is the focus of this Report. Four features of the domain stand out as distinctive.

First, many of these commodities are perishable or require special treatment, raising the costs of delays or supply chain disruptions. The problem is particularly acute when shipments of perishable commodities fall disproportionately at certain times (as with cut flowers on Mother’s Day). In addition to perishability, some products are also fragile. Unlike with most other commodities, inspection itself may damage the products (as with cut flowers or sealed food packages), and treatment to address potential violations (e.g., spraying) can also destroy them.

Second, in addition to the traded products themselves, agricultural inspection is also concerned with phytosanitary issues. This concern extends beyond agricultural shipments *per se* to non-agricultural shipments that may contain pests (as with beetles in wood products or pallets that can infest trees, fomites in ordinary containers that would spread animal disease, slugs and snails that attach themselves to the outside of shipping containers, etc.). The potential costs of inadvertently importing certain types of pests can be extraordinary; in the case of coleoptera, spread may involve the loss of whole species or ecosystems.

Third, in part as a result of phytosanitary concerns, the range of violations related to agriculture are likewise extremely broad. They may include:

- products made through agriculturally destructive means (such as palm oil from plantations established through rainforest destruction or bushmeat from potentially endangered species)
- undervalued items,
- mislabeled or fraudulent products (such as honey that contains added sweetener or products incorrectly manifested as “organic”),
- sanctioned goods (e.g., Russian fish products),

- unsafe products (e.g., spoiled meats),
- diseased or invasive life forms, such as plants of the Federal Noxious Weeds (FNW) list,
- contraband hidden in shipments, and
- a range of phytosanitary concerns.

As with potentially hazardous chemicals and biological agents, determinations about agricultural issues and phytosanitary requirements sometimes involve off-site laboratories (see *inter alia* CBP 2024c).

Fourth, CBP must cooperate with the U.S. Department of Agriculture (USDA) in determining which shipments should be released, and the nature of this collaboration is different from CBP's arrangements with some other partner agencies. The costs of inspection for many products, such as animals, are recovered through user fees. There are designated POEs for the importation of livestock, which is only permitted from some countries. Importers require an import permit from and must be inspected by the USDA's Animal and Plant Health Inspection Service (APHIS), and they must pay a fee to defer the costs of inspection. For cows/ruminants, not only must importers obtain a permit, but the animals must also be tested before departure and then again upon arrival in one of two POEs with quarantine facilities. Naturally, this process is far more intensive than the typical importation, and cross-agency collaboration must work well if it is to be efficient (*inter alia* GAO June 2021).

#### Implementation issues specific to the mode

As elsewhere, CBP adopts a risk-based approach to agricultural inspection. However, the notion of risk-based inspection has a different connotation in the context of phytosanitary concerns.

The agencies [CBP and USDA's APHIS] focus inspection activities on commodities with a higher risk of disease and pests, specific high-risk pests, or agricultural commodities imported from high-risk countries. CBP also uses this approach to determine which shipments are higher risk and require greater security against the introduction of pests into the United States. For example, CBP prioritizes inspecting shipments from countries where certain species that APHIS considers high risk originate. The Asian gypsy moth and Mediterranean fruit fly are two such species. (GAO June 2021)

It is not clear whether the Risk-Based Sampling (RBS) model used in agriculture for pest detection actually creates the right incentives for The Trade, as other risk-based strategies are designed to do. Although the Agricultural Quarantine Inspection (AQI) alters incentives by making delays more common for commodities without pests, the program does not levy fines and may not target properly specific shippers, routes, or (agricultural) fields. In other words, the penalties are not necessarily imposed on the right place to prevent the movement of pests through the GSS.

In general, supply chain transparency is even more essential in agriculture for identifying violations and controlling pests. It is also likely to be more effective than in manufacturing, and verification may be easier. For instance, aerial analysis of cropland (including through hyperspectral imaging) can be extremely helpful for inspection and verification of supply chain information.

A final issue concerns the potential opportunities for cargo preclearance (along the lines of the NARP program). Preclearance could be highly beneficial when it comes to certain types of shipments (e.g., cut flowers or melons), especially at peak periods.

### Outbound

Outbound issues are particularly important for North American integration (given phytosanitary concerns and health and safety standards). This is particularly true when it comes to harmonization of authorities between the United States and Canada and surveillance of certain pests (especially wood-boring beetles).

### Recommendations for CBP to consider

Further research and analysis is needed to understand how the central recommendations – particularly supply chain transparency, NII, and trusted networks – in this Report can best be applied to agriculture in operational terms. International collaboration on management of pests among CBP’s analogous agencies abroad represents an opportunity for international engagement, whether through multilateral venues such as the International Plant Protection Convention (IPPC) or bilateral arrangements with countries in the same climactic zones, that go beyond ISPMs, especially on wood-boring beetles. At the same time, CBP should join other U.S. agencies in arguing against misguided policies designed to discriminate against American exports under the guise of phytosanitary protection, such as Mexico’s proposed ban on genetically modified maize.



## Appendix 7: Interviews, site visits, and other research

The research itself included dozens of interviews with a range of people involved in POE operations: current and former U.S. government officials, current and former officials of foreign governments, domestic and foreign experts on border management, senior managers from The Trade, and experts on particular technologies – for instance, non-intrusive inspection technology or artificial intelligence for the analysis of Big Data. Research also included visits to major ports in foreign countries (the United Arab Emirates, Singapore, and Australia), as well as visits to the U.S. POEs of Los Angeles/Long Beach, Newark, Teterboro airport, and five POEs on the southwest border.

As the project progressed, it became clear that heterogeneity among maritime ports necessitated greater attention to this mode. Because it was logistically and budgetarily impossible to visit large numbers of maritime ports, we supplements these visits with virtual tours and other online material from foreign ports. The sample of ports reviewed consisted of (a) a purposive sample of large seaports, including those the project team had considered visiting but did not, and (b) a random sample of the 500 largest ocean ports from around the world. The main goal was to obtain video that revealed the operation of gantry cranes and prime movers within the port, in order to better understand how increased inspections could feasibly be carried out.

Naturally, research included an extensive review of the academic literature, collectively covering hundreds of scholarly publications. The most useful and relevant of these – which constituted about half of the publications reviewed – are listed in “[Sources Reviewed](#)”. In general, the scholarly literature is well developed with respect to radiation scanning but less so on other topics covered in this report. A few publications and books by experts in the customs world (most notably by former WCO head Lars Karlsson, Seth Stodder, and Stephen Flynn) have suggested broader visions of how customs organizations can respond to changing globalization; some of these ideas dovetailed with the findings in this Report. However, there was very little relevant academic material on topics like pedestrian crossings, GA, mail depots, targeting, vetted traveler programs, vetted shipper programs, and NII at seaports. In these cases, project personnel relied on articles and reports from multinational organizations, think tanks, trade groups, and the popular press; the most directly relevant, which were cited in earlier drafts of this Report but not in the final version, are listed in the “[Sources Reviewed](#)”. Project personnel also researched a small number of leading companies that are important for POE operations in order to better assess activities within The Trade not discussed elsewhere and to understand corporate strategies in the current environment.

Project personnel reviewed a wide array of public government documents, including reports by multinational organizations and foreign governments; reports and press briefing documents from the Department of Homeland Security; reports and briefing documents from CBP; reports by the U.S. Congressional Research Service and the Government Accountability Office; White House guidance and press releases; Hill testimony by experts and senior officials; statistical information on border crossings (from the Department of Transportation) and trade (from the Department of Commerce); black-letter law and regulations; and international agreements. These – especially CBP’s own documents – proved to be by the richest source of material for information about POE operations in the United States, NII, and related topics.

Because the project was entirely in the public realm, project personnel did not review or rely directly upon any classified documents. However, senior project personnel with current or former

TS/SCI security clearances are familiar with relevant classified material (e.g., on targeting and intelligence-sharing relationships with foreign governments), and this knowledge was useful background on those topics.

### INTERVIEWEE SELECTION

The original selection strategy for interviewees was as follows:

<b>Universe of possible interviewees</b>	<b>Sampling strategy</b>
All current and former senior officials from customs and border security agencies in foreign countries of interest	Purposive selection of those current and former heads who are (1) regarded as creative and effective, and (2) accessible and candid
Other current and former members of these agencies	Recommended individuals + convenience sample
Executives and government relations officers at major firms involved in import and export	Random sample at foreign POEs visited
Current and former CBP Commissioners, CBP Deputy Commissioners, and heads of the Office of Field Operations	Universal (i.e., as many as possible)
Current and former heads of Policy at CBP and other senior staff involved in ports issues	Universal (i.e., as many as possible)
Senior staff from CBP's Office of Trade	Purposive sample
Port directors and other senior field staff at OFO	Universal from POEs visited
OFO Officers at selected ports	Convenience sample from POEs visited
Border management and security experts and <i>eminences grise</i> .	Purposive selection of senior individuals, plus random selection from most impactful academics (as measured by citation count)
Developers of new technologies with applications to border management	Purposive selection of specific firms and scientists
Representatives of The Trade	Random sample + convenience sample of those at foreign POEs visited.

In total, project personnel held conversations with approximately 80 individuals over the course of project. Of these, three dozen were structured interviews; the rest were discussions that focused on one specific aspect of POE operations (e.g., NII or AI for targeting), group conversations with officials or senior private sector managers at port visits, or free-flowing, one-on-one conversations. With the exception of one “interview” conducted in the form of a lengthy email thread, interviews were a roughly even mix of virtual and in-person.

The interviewees were spread among the following three groups:

- CBP officials (~40%);
- Former CBP officials (~30%);
- All others, including private sector representatives, officials from foreign governments, and privately employed experts (all but two of whom had previously held senior positions in foreign governments or international organizations but were now consultants or employees of private firms).

Of the current CBP officials, individual interviewees were roughly evenly split between Headquarters and field personnel.

Several individuals were interviewed more than once; one senior CBP official was interviewed four times. Project personnel also spent extensive time with individual interviewees on some site visits, including several days of repeated conversations on the topics discussed here with one senior private sector manager abroad.

### **CONDUCT OF INTERVIEWS**

Structured interviews were conducted under the most generous rules possible to maximize interviewees' candor. All interviews were conducted on a not-for-attribution basis and comments that interviewees considered especially sensitive (e.g., remarks about specific individuals or firms) were not recorded. Where quotations from interviewees are used in the report (without attribution), interviewees were given the prior opportunity to review the quote and decide whether it should be used. (The same rules were extended implicitly to informal conversations and group discussions.) Interviewees were permitted to make any edits to the notes they saw fit. Although about half reviewed the notes they were sent, though only four chose to make systematic edits. One interviewee requested that the conversation be on deep background, with no quotations (even without attribution) and no acknowledgement of his/her participation.

Structured interviews were based on one of several modularized interview guides, which collectively ran to approximately 10 pages. However, these guides were administered loosely, leaving ample space for follow-up questions and unanticipated topics of interest. (Interview guides are available through Lawson upon request.)

The main approach in interviews as to ask interviewees to first imagine the ideal system of POE management, unencumbered by most current constraints, and work backwards from there, rather than to imagine incremental improvements from current operations. This approach generally proved effective in focusing discussions first on the vision and only later on the obstacles to that vision. However, almost all interviews covered current practices, as well as specific examples of successes, frustrations, and pain points.

Rapport was strong across the interviews. Bersin, Lawson, or other project personnel already knew approximately 2/3 of current and former CBP officials interviewed and about 1/4 of other interviewees. However, candor and informativeness were judged to be equally good among previously unknown interviewees. The lone exception was one foreign interviewee from The Trade, who appeared to be concerned with the potential business implications of the larger project.

Most interviews were conducted by Lawson, normally in combination with Bersin though sometimes singly or in combination with one of the Migration Policy Institute (MPI) team members. Site visits (including the conversations that accompanied them) to Abu Dhabi, the Port of Long Beach / Los Angeles, and Port of Newark were conducted by Bersin and Lawson. Site visits to the southwest border and Australia were conducted by the MPI team. The site visit to Singapore was conducted by Bersin. The site visit to a GA terminal was conducted by Lawson.

### **SELECTION OF FOREIGN BENCHMARKS AND SITE VISITS**

Locations for foreign visits were selected based on (1) project personnel's background knowledge of where POE innovations had occurred, (2) recommendations from CBP officials, (3) recommendations from other interviewees, and (4) size, with a bias for larger POEs. There was

considerable overlap among these for four notional lists. In the end, project personnel visited the following sites:

- Five POEs on the U.S.-Mexico border (interviews and port tours at San Isidro, El Paso, Laredo, McAllen, and Rio Grande Valley);
- Abu Dhabi in the United Arab Emirates (extensive interviews and port tours over three days);
- Singapore (informal interviews and port tour);
- Australia (extensive interviews and POE tours);
- The Port of Long Beach / Los Angeles (extensive interviews and port tour over a two-day period);
- The Port of Newark (extensive interviews and virtual port tour);
- An international GA terminal at Teterboro airport.

Most of the project team had already conducted many site visits to seaports and POEs as part of past research and during government service.

Four additional international visits were originally considered but ultimately rejected: Israel, the port of Rotterdam in the Netherlands, the port of Antwerp in the Flemish region of Belgium, and the port of Hong Kong. A visit to Israel (which was explicitly *not* recommended by CBP officials) was rendered impossible by the outbreak of the Gaza War. It also proved impossible to secure a thorough port tour from authorities in Antwerp and Rotterdam, most likely because authorities there had recently been inundated with requests. Chinese government resistance to overtures from U.S. researchers working on a government-funded project with security implications likewise made it impossible to tour even Hong Kong's port and interview local officials. (CBP staff reinforced the notion that it would be difficult to obtain useful information from Chinese officials.)

To make the most of site visits, research assistants for the project team reviewed publicly available material and prepared lengthy briefing memos, running to 67 pages). These memos encompassed sites the project team considered visiting but ultimately did not (e.g., Israel). Backgrounders are not included in this Report but are available to other researchers upon request.

## **WORKSHOPS**

To stress-test the main conclusions in the Report, project personnel organized several invitation-only workshops or meetings with experts, former officials, and current officials. These included:

- An online workshop hosted by MIT's Policy Lab, involving project personnel and six international experts with government and private sector experience on customs issues, with active moderation by Lawson, in June 2024;
- A meeting between Lawson, Putzel, and individuals familiar with The Trade and trade-related regulations in August 2024;
- An online meeting of former senior CBP officials in mid-August 2024, led by Bersin and Lawson;
- A separate online meeting with current mid-level and senior OFO officials from the field in mid-August 2024, led by Bersin and Lawson; and
- A large, hybrid in-person/online meeting hosted by MPI in early September 2024, in which all project personnel participated.

Bersin and Lawson also separately socialized the Report with a small number of current and former senior officials at CBP and other experts in POE operations. The final version of the Report reflects the (extensive) written and oral feedback from all of these events and interactions.

## **REPLICATION AND REPRODUCTION**

Notes from interviews, meetings, conferences, and site visits totaled approximately 300 pages. All interview guides, field notes, briefing memos, an extensive annotated bibliography, and a list of videos of maritime port operations are available to scholars upon request. Sanitized and deidentified notes from interviews are also available upon request (via Lawson) to other scholars for the purpose of reproducing the study, subject to prior permission from the interviewees. Lawson is also available to connect scholars who seek to reproduce any part of this project with interviewees, subject again to the agreement of the interviewees.

## **IRB AND ETHICAL CONSIDERATIONS**

As an academic project, all interviews and other research were approved by the relevant Institutional Review Boards, with MIT's Committee on the Use of Humans as Experimental Subjects (COUHES) being the primary referent. The research was judged Exempt (E- 4652). In accordance with IRB requirements, all project personnel completed MIT's required online human subjects training for "Social & Behavioral Research Investigators" through the University of Miami's CITI program ([Research, Ethics, Compliance, and Safety Training \(citiprogram.org\)](https://citiprogram.org)). In addition to this training, Lawson completed other MIT training and the responsible and ethical conduct of research (RECF) training through the CITI portal; he also teaches an advanced course on qualitative methods for doctoral students at MIT, which includes extensive discussion of ethics involved in field research, and has served on COUHES. Per the protocol, all interview and field notes were encrypted and stored separately from identifiers (which were likewise stored in an encrypted file). No adverse events occurred in the course of the project.

The ethical obligations upon researchers, of course, go beyond IRB requirements. In the context of this project, the primary considerations were potential conflicts of interest and the potential professional implications for interviewees from participation in the project (above and beyond the concerns associated with confidentiality). Lawson discussed these issues with project personnel who were less familiar with IRB requirements at various stages. Again, no conflicts or adverse events arose.

## **CONFLICTS OF INTEREST**

None of the project personnel had or have any direct conflict of interest. Bersin declares a potential conflict of interest stemming from his role as an investor and Executive Chairman of the Advisory Board in Altana (<https://altana.ai/>), a firm that provides AI-enabled targeting services. In the course of the project, Altana reached a business arrangement with CBP and other U.S. agencies. However, Bersin's involvement with Altana was unrelated to his involvement in the project and presented no actual conflict; there was no tension between the findings of the Report and the prospective relationship between Altana and CBP.

## **CO-AUTHORSHIP STATEMENT**

Research for the project and authorship of the Report was joint. Although the MPI team focused more on the people side and Bersin and Lawson focused more on the cargo side, all authors contributed to the writing and revision of all sections. Lawson serves as first author and as Corresponding Author on behalf of the project team.

## Appendix 8: About the authors

Alan Bersin is a Global Fellow and the Inaugural North America Fellow (Mexico and Canada Institutes) at the Wilson Center; Senior Fellow in the Homeland Security Project at the Belfer Center for Science and International Affairs at Harvard's Kennedy School of Government; and former Commissioner of U.S. Customs and Border Protection and Assistant Secretary of Policy and International Affairs at the Department of Homeland Security; and Southwest Border Coordinator for the Attorney General and Department of Justice as U.S. Attorney in the Southern District of California. A graduate of the Yale Law School, he is the co-author of *Homeland Security: An Introduction*, a textbook published by Oxford University Press in 2021 and co-editor (with Chappell Lawson and Juliette Kayyem) of *Beyond 9/11: Homeland Security for the 21<sup>st</sup> Century*, MIT Press, 2020.

Meghan Benton is the Director of the International Program at MPI, whose work focuses on borders and mobility around the world. She is widely published on issues of mobility, borders, immigrant integration, and labor markets, and she has been leading a global project on borders and mobility, assessing the key opportunities for returning to mobility around the world and ways of improving border processing. She holds a PhD from University College, London. Among her most recent publications are *Covid-19 and the State of Global Mobility in 2022* (IOM, MPI, 2022); *Future Scenarios for Global Mobility in the Shadow of the Pandemic* (MPI, 2021); *The Future of Remote Work: Digital Nomads and the Implications for Immigration Systems* (MPI, 2022); and *Equipping Immigrant Selection Systems for a Changing World of Work* (MPI, 2019).

Chappell Lawson is an Associate Professor of Political Science at MIT, who served almost two years at CBP while on leave from MIT, and whose current research focuses heavily on homeland security. Professor Lawson has conducted several major social science research projects based on ethnographic and interview research – on issues as diverse as cybersecurity, homeland security, and media practices – and has taught a cross-disciplinary doctoral seminar on qualitative research methods. He holds a PhD from Stanford University.

He is the editor (with Alan Bersin and Juliette Kayyem) of *Beyond 9/11: Homeland Security for the 21<sup>st</sup> Century*, MIT Press, 2020, as well as author (with Alan Bersin) of the introduction and conclusion of the volume and two chapters: “The Trusted and the Targeted: Segmenting Cross-Border Flows by Risk” and “Homeland Security and Transnational Crime” (with Alan Bersin). Other recent publications on topics related to the project include: “Integration of Effort: Securing Critical Infrastructure from Cyberattack,” *Public Administration Review* [with Sean Atkins], 2022; “An Improvised Patchwork: Success and Failure in Cybersecurity Policy for Critical Infrastructure,” *Public Administration Review* [with Sean Atkins], 2021; “Want to fix the Border Patrol? Don't copy police reform efforts (azcentral.com)” *Arizona Republic* [with Josh Kussman], 2021; “Disrupting Transnational Criminal Activity: A Law Enforcement Strategy for Homeland Security,” *Homeland Security Paper Series*, Belfer Center for Science and International Affairs, Harvard Kennedy School. [with Alan D. Bersin], 2021; “How Not to be the Mouse: What COVID Teaches Us about Homeland Security”, *Journal of Homeland Security and Emergency Management*, 2020; “Collaborative Border Management”, *World Customs Journal* [with Alan Bersin], 2020; “Loving Field Work in a time of COVID”, *Social Science Research Council* [with Fotini Christia], 2020.

Colleen Putzel-Kavanaugh

Colleen Putzel-Kavanaugh is an Associate Policy Analyst with MPI's U.S. Immigration Policy Program, where she focuses on the U.S.-Mexico border, including analysis of trends in border arrivals, migration at and between ports of entry, migrant processing, and the role of NGOs in border communities. She joined MPI after three years in San Diego, conducting research and working with asylum seekers at the U.S.-Mexico border. Previously, Ms. Putzel-Kavanaugh interned with the Bipartisan Policy Center, the office of San Diego Mayor Todd Gloria, and Al Otro Lado. Prior to her work as a researcher, she was a 7th and 8th grade teacher. Ms. Putzel-Kavanaugh holds a BA in English literature from Assumption College and an MA of Peace and Justice from the University of San Diego's Joan B. Kroc School of Peace Studies, where she focused on human rights, immigration, and corruption.

Andrew Selee is President of the Migration Policy Institute and the former Executive Vice President of the Woodrow Wilson Center. His research focused on immigration and border policies in the United States and Latin America, and he has researched and written extensively about U.S. and global borders. He holds a PhD from the University of Maryland. He is the author of *Vanishing Frontiers: The Forces Bringing Mexico and the United States Together* (PublicAffairs, 2018), which focuses extensively on innovations in border management. His opinion articles have been featured in *Foreign Affairs*, *Foreign Policy*, *Wall Street Journal*, and *New York Times*, among others. He teaches courses at Georgetown University.

## Appendix 9: Original project proposal and workplan

### Project Personnel

Name	Role	Position/Title	Primary Affiliation
Andrew Selee, PhD	Co-PI	President	Migration Policy Institute (MPI)
Meghan Benton, PhD	Co-PI	Director, International Program	Migration Policy Institute
Chappell Lawson, PhD	Co-PI	Associate Professor of Political Science	Massachusetts Institute of Technology (MIT)
Alan Bersin, Esq.	Co-PI	Former Commissioner of Customs and Border Protection	Independent consultant

### Project Abstract

Border management is a longstanding challenge for DHS—especially but not exclusively for U.S. Customs and Border Protection. The Covid-19 pandemic exposed and exacerbated bottlenecks, while also spurring innovation and suggesting opportunities for improvement. In addition, technologies (especially in terms of data analytics and scanning) have continued to evolve rapidly. This project will take stock of these developments, reflect on how the most leading edge innovations could reshape the borders of the future, and learn from international examples that suggest lessons for the United States. *The details of the research will be built, in large part, from the key areas of interest that CBP leaders and staff have identified for the future of border management, although we will also suggest a few additional areas that we believe are particularly relevant.*

### Summary of Research Methods/Technical Approach

This project will identify ways to improve management of U.S. land, air, and sea borders in ways that simultaneously enhance security while facilitating trade and travel. In particular, it will focus on the better use of data and advanced analytics for risk management across a broad range of risks (contraband, dangerous materials, infectious disease, etc.).

Data and data analysis have been an area of huge technological advancement over the last two decades. This technological revolution in turn means that (a) there are almost certainly unexploited opportunities for improvement in port of entry operations, and (b) it is essential to understand how continuing development of AI may or may not affect POE operations. With respect to (b), even if it is impossible to fully predict the next decade or two of technological development, it is possible to glean enough of a sense about the direction and pace of innovation to make broad recommendations about port of entry operations, and to identify potential government policies that would inadvertently preclude DHS’s ability to exploit further innovation.

This project will scope the potential for recent developments to rethink the borders of the future. Our approach is not to be bound by current limitations of policy or operations but rather to identify and articulate the ideal future approach to data in ports of entry operations. By developing an ambitious vision of how innovations could reconfigure operations, we will be able to evaluate the current state of play to identify gaps and obstacles in moving toward the ideal state. Central to this



project will be learning from the experiences of other countries in deploying new techniques and technologies, and learning from firms and prominent engineers about likely technological developments in the next decade.

First, the co-PIs will consult with DHS policymakers (especially CBP) early in the project and at regular intervals (ideally each quarter) throughout to determine the exact content of the research and which topics are most pertinent. <sup>1</sup>As the research progresses, these consultations will move from defining topics to “test-driving” possible adaptations for U.S. operations based on the practice of other countries. The co-PIs will also conduct two trips to the border (northern and southern) during the project to help ensure the greatest relevance of the findings and interview officials at other agencies when relevant (e.g., intelligence community, DOJ).

Second, the project will include at least 50 in-depth interviews with officials in other countries, as well as former official and non-governmental partners (e.g., major private sector firms, established technology vendors, tech start-ups in scanning and artificial intelligence, and leading engineers based in universities or national laboratories) who have been intimately involved in border management. Many of these would be identified directly by CBP/DHS colleagues, but we will suggest others through our own professional networks and research to see which are the most relevant to CBP colleagues.<sup>2</sup> The central purpose of the interviews will be to identify both successful and cautionary examples of policy and technological innovation at ports of entry. Interviews will be conducted both virtually (via Zoom) and in-person by the PI and co-PIs, accompanied as necessary by graduate research assistants. Interviews and conversations will be based on a pre-designed interview guide, deployed flexibly to allow for exploration of unanticipated topics. The research will include travel to several of the other countries, while a few may need to be done virtually.

Third, the co-PIs will organize an invitation-only workshop with DHS policymakers, outside experts, and former US policymakers at MIT.

The project will finish with a final report that lays out specific areas for innovation and improvement that will be shared in private briefings and a small conference with DHS policymakers. A version of the report appropriate for public access will be published on MPI’s website.

The specific topics to be researched will emerge from the conversations with DHS officials. However, some of the topics below might be part of a list to discuss initially:

- Identity documentation, including vaccine and testing verification and interoperability, and biometrics.
- Advance information (and related analytics) to permit the segmentation of entries across the entire spectrum of risk, including not only blacklisting, watch-listing, and whitelisting or

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<sup>1</sup> Among those we would consult at CBP are [names deleted]

<sup>2</sup> The Co-PIs have strong networks through their existing work, but we will take guidance from CBP officials on the most relevant government officials and other institutional partners around the world to interview. Once the appropriate contact has been identified, interviewees will be invited to participate through a formal email requesting the interview, to include information (research rationale, information about confidentiality and use of data etc.). All research will be conducted under IRB guidelines and according to the principle of informed consent.

“clearlisting” (trusted traveler/vetted shipper programs), as well as techniques for allocating inspection resources among the remaining entries.

- Scanning technologies, involving x-rays, ions and chemicals, as well as emerging standoff detection technologies, to detect a range of threats (e.g. radioactivity, contraband, public health screening), that can be deployed strategically to enhance accurate targeting while minimizing cross-border backlogs and delay.
- Drone technology and other emerging technologies, enabling “remote/virtual” border management, and especially the integration of data from such technologies.
- Transitioning to green trade initiatives.
- Biometrics technology, both in current and potential future forms.
- Tracking technology that allows monitoring of cargo vehicles.
- Blockchain technology and its effects on transparency and accountability of transactions.
- Partnerships with the private sector actors involved: airlines, shippers, customs brokers, harbormasters, ordinary citizens (as with the U.S. Coast Guard’s Auxiliary), and other stakeholders, especially as regards data access and integration.
- Relationships with foreign counterparts regarding data/data analysis on risky entries.
- Major successes and errors in attempts to improve port of entry operations through the use of improved data analytics.

We tentatively plan to focus on the following countries: Canada, Mexico, Singapore, Israel, the Netherlands (especially with respect to seaports and imaging at airports), and one Gulf state (to be determined). However, we also hope to include less extensive investigations into United Kingdom, Australia, New Zealand, India (especially with respect to the use of big data for dutiable items), Japan, and South Korea. All of these countries are either regarded as technology leaders and innovators in port operations in at least some areas – from management of infectious disease to data integration for law enforcement targeting – or (in the case of Canada and Mexico) are inherently crucial to U.S. port operations. However, we recognize that the mix of countries might change as a result of our conversations with DHS officials, and we will adjust the mix of countries as the topics warrant.

The PIs will pull together the conclusions and insights into a final report that is actionable and forward-looking, with practical suggestions for best practices and developing ideal “ports of the future”.

Partners and Roles: The Migration Policy Institute (MPI) and MIT’s Policy Lab (PL@CIS) will work collaboratively to implement this project, with guidance from Alan Bersin, former Commissioner for CBP and Assistant Secretary of Homeland Security for Policy.

#### Key Milestones

- Milestone 1: Kickoff meeting and ensuing discussions between the PIs and DHS officials.
- Milestone 2: Extensive interviews with U.S. and foreign counterparts.
- Milestone 3: A conference at the Massachusetts Institute of Technology to review the main findings and discuss their practical details. This conference will include relevant U.S. officials, a small number of invited officials from foreign governments identified in the course of our interviews, leading engineers and data scientists at U.S. universities and national laboratories, and firms actively engaged in developing and commercializing relevant new technologies.

- Milestone 4: Writing and – through consultation with U.S. officials – iterative rewriting of a report articulating a vision for the future and the path to that future, together with a final event with selected DHS and other USG officials to share findings.

#### Expected outputs

While the discussions themselves will serve as a key mechanism to socialize ideas and drive important conversations, final policy report should serve as a reference document. It can be accompanied by other forms of presenting the same material (e.g., a PowerPoint slide deck, a briefing memo for legislators, briefing materials for the press, etc.). Where desired, the PIs will analyze the costs (and cost savings) associated with specific changes.

#### Anticipated benefit to DHS stakeholders

Our goal is to help DHS and its stakeholders develop a vision for the more effective use of data in order to enhance border security.

#### Note on interviews

All research for the project will be done in keeping with Institutional Review Board rules, which will follow MIT policies and procedures. (MIT's IRB is known as the Committee on the Use of Humans as Experimental Subjects, or COUHES). COUHES's current policy is that MIT researchers with PI status whose are up-to-date on their training do not need to file for prior approval in any survey or ethnographic research with adult, non-institutionalized subjects where there is no chance of harm to the subjects and deception is not part of the research design. All researchers involved in the project, whether or not employed at MIT, will take COUHES's online training.

Project Timeline

Tasks, Milestones, and Outputs	Q1	Q2	Q3	Q4	Q5	Q6
Kickoff meeting (within 30 days from award) and subsequent check-ins with CBP	█	█	█		█	█
Review of existing studies of innovations in border management	█					
Interviews with relevant S&T, CBP, and DHS-HQ staff	█					
Targeted outreach to international contacts and preliminary virtual interviews to support planning for international travel	█					
Interviews: Officials in Mexico and FIVEYES countries		█	█			
Interviews: Officials in Singapore, Japan, and South Korea			█	█		
Interviews: Officials in Gulf states and Israel			█	█		
Interviews: Tech firms regarding (a) targeting and use of AI, (b) scanning, and (c) assessment of partnerships			█	█		
Interviews: Officials in India				█		
Interviews: Officials in Netherlands				█		
Re-interviews with all sources as needed; supplementary interviews as needed				█	█	
Conference at MIT's Center for International Studies: officials from DHS and abroad, engineers, and firms				█		
Prepare draft report and socialize with DHS interlocutors, interviewees, and other experts						█
Final submission of report and seminar with DHS and other USG stakeholders						█

### Available Resources, Facilities, and Leveraged Funding

MPI has ongoing global work on mobility and borders, including an annual analysis of changing policies at borders around the world (with IOM), which will allow comparing experience across other national cases and bringing in international experts at key moments, as relevant. MPI also convenes the Transatlantic Council on Migration, which convenes senior policymakers from Europe, the United States, Canada, and Australia for frequent off-the-record conversations on borders, mobility, and migration.

MPI also has an active US Immigration Policy Program, led by former INS Commissioner Doris Meissner (Acting Commissioner 1981-82, Commissioner 1993-2001), which follows border mobility issues closely and will support the work of this project, and a sister organization in Brussels, MPI Europe, which can facilitate key contacts in the European Union.

The Policy Lab at MIT's Center for International Studies will convene a conference as part of the project, drawing in interested faculty, postdoctoral fellows, and advanced doctoral students from all multiple Schools at the Institute and the Schwartzman College of Computing. The Policy Lab commits to covering at least half of the expenses associated with the event.

## Appendix 10: Sources reviewed

### ACADEMIC PUBLICATIONS AND RESEARCH STUDIES

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#### **MARITIME PORT OPERATION VIDEOS**

(available upon request)