



**How to Measure Effective Border Security: A Focus on Metrics and  
Recommendations for Addressing Illicit Arms and Technology Transfers**

By Minta Caune, Mary Claire Flynn, Hadley Herbst, Caroline Heyburn, Samuel Medina, and

Brendan O'Connor

Department of State Diplomacy Lab: SISU-419-007

May 1, 2024

## Table of Contents

Executive Summary.....	3
List of abbreviations and acronyms used.....	6
Introduction.....	7
Methodology.....	7
Metrics.....	8
Challenge 1: Geography.....	10
Challenge 2: Range of Threats.....	13
Challenge 3: Implementation and Governance.....	20
Challenge 4: Barriers to Cooperation.....	26
Conclusions.....	29
Bibliography.....	31

## **Executive Summary**

This report was produced at the request of the Export Control and Related Border Security (EXBS) Program, within the Bureau of International Security and Nonproliferation, by a spring 2024 Diplomacy Lab team at American University's (AU) School of International Service.

The research team, composed of six AU seniors, identified the best practices and metrics to improve border security in EXBS partner countries. The team was asked to focus on the illicit trade of weapons and technologies—from small arms and light weapons (SALW) to weapons of mass destruction (WMD). The clients expressed interest in best practices to implement at formal border ports of entry (POE) and across “green” and “blue” borders.

The authors identify useful metrics to measure the effectiveness of border security based on multiple approaches from a variety of border agencies, international organizations, and expert reports. Several international organizations offer broad measurements of security, democracy, and threat scores that can be valuable for understanding and assessing a country's border management strategy.<sup>1</sup>

Following this analysis, the authors identify the main challenges of developing effective border security to mitigate illicit arms and technology transfers. The paper groups these challenges into four categories: geography, range of threats, implementation and governance, and barriers to cooperation. For each challenge, the authors provide examples of best practices and case studies related to both border security and border management.

The paper considers a variety of practices from different countries and evaluates whether each practice directly responds to one of the four border security challenges; whether the practice is widely applicable; whether there is a strong foundational and operational capability to implement such suggested practices; previous failures and potential pitfalls of the practice; and the limiting factors of the practice, such as financial and political barriers.

Some key solutions identified include the development of a National Action Plan (NAP) that targets the transfer of illicit weapons and technologies across POEs; multilayered and diverse approaches to security; the use of strategic technology and equipment procurement; the development of intelligence and data sharing; frequent reviews of strategies related to training and other operations; and collaboration with cross-border, regional, and international partners.

The group has identified the following key challenges and best practices for enhancing border security, management, and strategy:

### **Challenge 1: Geography**

**Problem:** Geography is a major obstacle that must be considered in a country's NAP. Managing a border that is thousands of miles long with potentially many natural obstacles can result in

---

<sup>1</sup> Daniel Kaufman and Aart Krray, “Worldwide Governance Indicators,” World Bank, 2023, <https://www.worldbank.org/en/publication/worldwide-governance-indicators>.

vulnerable areas between POEs. Long coastlines, changing smuggling routes, and border infrastructure upkeep are some of the many border security challenges related to geography.

**Best Practices:** In response to these issues, various sources and experts recommend using a layered, multi-technology approach that includes *ground sensors, aerial surveillance, signals analysis, satellite surveillance, agile vehicles (for patrols), and physical boundaries* to help funnel border traffic into well-controlled POEs. Many of the technologies suggested in this section serve to reduce the need for physical border patrols in difficult terrains and artificially increase the surveillance capabilities of border officials. The group recognizes that some of the technologies may be well beyond the budget availability and human capacity of some countries.

### **Challenge 2: Range of Threats**

**Problem:** In addition to varying geographic obstacles, each country must also consider a range of threats. There is a large variety of weapons that are transferred illicitly including *SALW, advanced weapons, and WMD*, which overlap with the categories of *dual-use materials* (materials with both commercial and military uses) and *illicit technologies*. It is difficult to identify which threats are the highest priority for the national security of different countries, as well as to create border systems that are flexible enough to respond to the diverse set of threats faced by many countries.

**Best Practices:** To identify and address the main threats to their border, countries should utilize *layered security structures at and between POEs; international agreements relating to SALW, WMD, and dual-use materials; intelligence collection and sharing; and cross-border shared management collaboration*. These methods help countries best utilize their available resources. It is beneficial for partner countries to develop new strategies and action plans to effectively reduce more than just traditional arms transfers and to work with others to regularly update the strategies to face evolving threats and practices by smugglers.

### **Challenge 3: Implementation and Governance**

**Problem:** Many national governments lack the *political will* and the *human capacity* to implement reforms due to *internal corruption, intricate legislative processes, and scarce resources*. Corruption poses a formidable obstacle to border security, rendering even well-established processes and infrastructures ineffectual. Shortcomings in border management and implementation make it increasingly difficult to solve funding issues and allow for inefficient systems to persist.

**Best Practices:** The *implementation of a NAP* that delineates specific threats, facilitates coordination between national agencies, and focuses specifically on mitigating the illicit trade of weapons and technology is a critical first step. In addition to this, best practices include: *employing multifaceted training sessions conducted by other more capable or expert agencies, deploying surveillance tools and other tools to help dissuade corruption, garnering support from international assistance providers and capitalizing on effective procurement strategies*.

#### **Challenge 4: Barriers to Cooperation**

**Problem:** From *territorial disputes to personality differences*, difficult relations with neighboring states and among internal agencies hinder effective border management and security.

Unrecognized border lines and unpatrolled neutral areas create an environment where illicit weapons and technologies can be smuggled more easily without detection.

**Best Practices:** Cooperation is more likely with the help of *third-party countries* and *international organizations*. Neutral third parties offer a pathway for agreements to be made even if negative sentiments exist. They can offer incentives to create new border agreements and better results. *Utilizing joint training efforts and Open-Source Intelligence (OSINT)* can be a starting point to help develop trust and information collaboration. Additionally, *establishing regular meetings* between border and law enforcement agencies enhances internal cooperation as well as cooperation with other countries. It is possible for countries with strained relations to recognize the shared need for effective border security and work together. All of this requires persistent and dedicated effort.

In sum, there is not a single formula for establishing effective border security, but there are a range of proven practices and actions that can provide improved results for the wide variety of border environments that countries face. International cooperation, dialogue and assistance are all vital to improving results.

## List of abbreviations and acronyms used

<b>ATS-G</b>	Automated Targeting System-Global
<b>BSM</b>	Border Security and Management
<b>CBP</b>	Customs and Border Protection
<b>CBRN</b>	Chemical, Biological, Radiological, and Nuclear Weapons
<b>CYCLOPS</b>	Cyprus Center for Land, Open Seas, and Port Security
<b>DHS</b>	Department of Homeland Security
<b>EDF-RAN</b>	European Document Fraud Risk Analysis Network
<b>EUROSUR</b>	European Border Surveillance System
<b>EXBS</b>	Export Control and Related Border Security
<b>FRAN</b>	Frontex Risk Analysis Network
<b>Frontex</b>	European Border and Coast Guard Agency
<b>GCTF</b>	Global Counterterrorism Forum
<b>GEOINT</b>	Geospatial intelligence
<b>GTAS</b>	Global Travel Assessment System
<b>IBM</b>	Integrated Border Management Framework
<b>INTERPOL</b>	International Criminal Police Organization
<b>ISIS</b>	Institute for Science and International Security
<b>KPIs</b>	Key Performance Indicators
<b>MAGE</b>	Mobile Awareness GEOINT Environment
<b>NAP</b>	National Action Plan
<b>OPCW</b>	Organization for the Prohibition of Chemical Weapons
<b>OSINT</b>	Open-Source Intelligence
<b>PoA</b>	Program of Action
<b>POE</b>	Ports of Entry
<b>PPI</b>	Peddling Peril Index
<b>RBS</b>	Risk-Based Screening
<b>RESCA</b>	Regional Centre on Small Arms and Light Weapons
<b>SALW</b>	Small Arms and Light Weapons
<b>SBInet</b>	Secure Border Initiative Network
<b>SIGINT</b>	Signals Intelligence
<b>STCE</b>	Strategic Trade Enforcement Program
<b>SWOT</b>	Strengths, Weaknesses, Opportunities, and Threats/Risks Analysis
<b>UNCCT</b>	United Nations Counter-Terrorism Centre
<b>UNFICYP</b>	United Nations Peacekeeping Force in Cyprus
<b>UNODC</b>	United Nations Office on Drugs and Crime
<b>UNSCR</b>	United Nations Security Council Resolutions
<b>WCO</b>	World Customs Organization
<b>WMD</b>	Weapons of Mass Destruction

## **Introduction**

This report explores the primary challenges faced by countries seeking to improve the security of their borders against illicit arms and technological transfers. From the research undertaken, the report identifies best practices and case studies for overcoming each of these challenges.

The areas of focus in this report are the illicit trade of weapons and technologies—from small arms and light weapons (SALW) to weapons of mass destruction (WMD). Many of our case studies originate from the United States and Europe, where robust border systems with reports and independent audits on border practices are more readily available. In addition to the U.S. and Europe, the authors also examined Southeast Asia and the Middle East and North Africa regions. However, these proved more difficult to find cases for, as many examples found did not have public reports. This team considers challenges both at defined POEs and across “green” and “blue” borders. Many of these areas lack physical barriers and require extensive surveillance.

In cultivating effective border security practices, countries face a range of challenges that affect the implementation of border strategy and border management practices. The authors identified four key challenges in these areas: geography, range of threats, implementation and governance, and barriers to cooperation. For each challenge, there is a list of best practices and relevant case studies.

The authors acknowledge the challenges outlined likely do not encompass the entirety of obstacles encountered by states in securing their borders. Furthermore, the team recognizes the varied nature of challenges faced by countries, as well as the existence of diverse responses. Although this report identifies a set of categories that can be widely applied to measure overall effectiveness in certain areas of border security and management, country-specific challenges require more unique metrics and measuring abilities to determine success. Through the bolstering of internal review processes, these areas can be addressed on national and regional levels.

The recommendations and findings presented in this report were compiled by six student researchers under the guidance of Ambassador Earl Anthony Wayne, as part of the Department of State’s Diplomacy Lab program. The research team is composed of Minta Caune, Mary Claire Flynn, Hadley Herbst, Caroline Heyburn, Samuel Medina, and Brendan O’Connor.

## **Methodology**

Border security consists of a combination of border strategy and border management, with the former relating to policy frameworks and legislative measures and the latter to on-the-ground border control operations. In line with this, the four challenges selected are based on the literature reviewed to present a holistic view of the strategy and management challenges that U.S. and international partners face when securing their borders.

The best practices are derived from discussions with eleven border security experts from the U.S. Customs and Border Protection (CBP), EXBS, academia and the private sector. The team

analyzed border practices from over 46 countries and various agencies, international organizations, and independent audit reports. When identifying key best practices, the team considered whether each practice directly responds to one of the four border security challenges; whether the practice is widely applicable; whether there is a strong foundational and operational capability to implement such suggested practices; previous failures and potential pitfalls of the practice; and the limiting factors of the practice, such as financial and political barriers.

## **Metrics**

When evaluating metrics relating to border security, countries should review internationally comparable metrics and perform their own internal evaluations. It is important to consider that there are several different types of metrics that evaluate countries on global, regional, and national levels.<sup>2</sup> The national-level metrics can help countries consider their specific border challenges. This is supported by the former Commissioner of U.S. CBP, Alan Bersin, who argues that country-specific metrics must be developed according to the scale of the specific problems at the borders and the intricate systems that exist; metrics can then be established by governing agencies such as the U.S. Department of Commerce, export control agencies, and the U.S. Department of Homeland Security (DHS).<sup>3</sup>

Tyler Hoffman from the Pacific Northwest National Laboratory asserts there is no one set parameter to measure success in this area.<sup>4</sup> In spite of this argument, this report has identified a variety of metrics and indices that countries around the world can reference for measuring their level of border security. Broadly applicable metrics allow for generalized capability comparisons, provide ways for countries to evaluate their progress, and help countries identify areas for improvement.

To ensure the continued effectiveness of metrics, a 2019 Texas Public Policy Forum report assessing U.S. DHS metrics suggests that every metric used by an agency should be audited and reported monthly, or at the very least, quarterly.<sup>5</sup> This allows policymakers to better respond to developments on the ground, increases oversight, and enables better studies by civil society and other reviewing bodies. Detection methods on the border and other data collection infrastructure should be checked frequently to ensure the validity and effectiveness of metrics systems.<sup>6</sup>

---

<sup>2</sup> Ruth Ann Duggan, *Metrics for Border Management Systems* (Albuquerque, NM, and Livermore, CA: Sandia National Laboratories), July 2009, <https://doi.org/10.2172/985498>.

<sup>3</sup> Alan Bersin (former Commissioner of CBP and DHS Under Secretary for Policy, Covington & Burling LLP), in discussion with authors, February 2024.

<sup>4</sup> Tyler Hoffman (Pacific Northwest National Laboratory), in discussion with the authors, March 2024; *PMOD Capability Roadmap*, U.S. Customs and Border Protection, May 2023, <https://www.cbp.gov/sites/default/files/assets/documents/2023-Oct/PMOD%20Capability%20Roadmap%20Final%20%28508%29.pdf>; Randall Hansen and Demetrios Papademetriou, *Securing Borders*, (Washington, D.C.: Migration Policy Institute, 2014), <https://www.migrationpolicy.org/sites/default/files/publications/BadActors-Hansen-PapademetriouFINALWEB.pdf>.

<sup>5</sup> Igor C. Magalhaes, “Border Security: An Assessment of the Metrics,” Texas Public Policy Foundation, October 2019, <https://www.texaspolicy.com/border-security-an-assessment-of-the-metrics/>.

<sup>6</sup> Raul Ortiz (25th Chief of the United States Border Patrol), in discussion with the authors, February 2024.



The most useful metrics and indices related to good practices in border security are listed in the table below.

Metric Type	Description	Relevant Reports
<b>Tactical Indicators</b>	On the ground metrics of border security efforts are extremely important in evaluating the success of border guards and technologies. Measures of the effectiveness of efforts can be considered by quantifying the amount of <i>interdiction</i> , <i>deterrence</i> , and <i>exploiting networked intelligence</i> . <sup>7</sup>	RAND Report (2010)
<b>Customs and Export Control Indicators</b>	The widely applicable indicators included in the WCO's Key Performance Indicators (KPI), and the Peddling Peril Index (PPI) allow countries to compare different areas of their export control capabilities. KPIs measure customs success and effectiveness by considering technical targeting and detection capabilities. They also evaluate a country's ability to combat the illicit trade of dual-use goods and secure against the proliferation of WMD and SALW. <sup>8</sup> Similarly, the PPI assesses international commitment, legislative strength, monitoring and detection abilities, and enforcement adequacy regarding strategic trade, including nonproliferation efforts and involvement in relevant treaties. <sup>9</sup>	WCO's Key Performance Indicators (KPI), Institute for Science and International Security's Peddling Peril Index (PPI)
<b>International Agreement Compliance</b>	Adherence to international standards provides an additional measure for success. UNSCR 1540 monitors and implements legislation to prevent weapons proliferation and transfers to non-state actors, focusing on export laws, border control, legal repercussions, and reporting mechanisms. <sup>10</sup> Although countries may not always be truthful in their reports, international agreements offer an alternative evaluation tool for border security in cases when a country's NAP is insufficient and adherence to their NAP is not a helpful measure.	United Nations Security Council Resolution (UNSCR) 1540

<sup>7</sup> Henry H. Willis, Joel B. Predd, Paul K. Davis, and Wayne Brown, *Measuring the Effectiveness of Border Security Between Ports-of-Entry*, Santa Monica, CA: RAND, 2010, [https://www.rand.org/pubs/technical\\_reports/TR837.html](https://www.rand.org/pubs/technical_reports/TR837.html).

<sup>8</sup> World Customs Organization, *Detailed List of KPIs*, <https://www.wcoomd.org/-/media/wco/public/global/pdf/topics/capacity-building/instruments-and-tools/pmm/kpis-for-the-pmm-v1.pdf>; "Membership," World Customs Organization, February 27, 2024, <https://www.wcoomd.org/-/media/wco/public/global/pdf/about-us/wco-members/list-of-members-with-membership-date.pdf?db=web>.

<sup>9</sup> David Albright et al., *The Peddling Peril Index (PPI) 2021/2022*, [https://isis-online.org/uploads/isis-reports/documents/ThePeddlingPerilIndex2021\\_POD\\_wCover.pdf](https://isis-online.org/uploads/isis-reports/documents/ThePeddlingPerilIndex2021_POD_wCover.pdf).

<sup>10</sup> UNODA, "UN Security Council Resolution 1540 (2004)," <https://disarmament.unoda.org/wmd/sc1540/>; United Nations "1540 Committee," accessed April 7, 2024, <https://www.un.org/en/sc/1540/national-implementation/1540-matrices.shtml>.

<p><b>National Self-Evaluation</b></p>	<p>Due to the variety of border challenges, some evaluations relating to border security need to occur on the national level. National level metrics include a country's adherence to its NAP and its ability to learn from previous border security efforts.<sup>11</sup> Considerations of the expansiveness of a NAP as well as how well it is being implemented can reveal information about how successful a country's border security is. When evaluating a NAP, countries can utilize Force-Field Analysis (FFA) in BSM to identify positive and negative influences on national border services and law enforcement agencies.<sup>12</sup></p>	<p>Global Counterterrorism Forum: Border Security Management (BSM)</p>
<p><b>Crime and Governance Indicators</b></p>	<p>Crime and governance indicators indirectly measure a country's ability to implement an effective border strategy. The World Bank's "Worldwide Governance Indicators" assesses the quality of a country's governance, including accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption.<sup>13</sup> Similarly, the Global Organized Crime Index evaluates state security threats for 193 countries on a scale of 1-10 along three key pillars: <i>criminal markets</i>, <i>criminal actors</i>, and <i>resilience</i>. The index prioritizes interventions and measures response effectiveness.<sup>14</sup></p>	<p>Global Organized Crime Index; World Bank's "Worldwide Governance Indicators"</p>

### **Challenge 1: Geography**

Most countries have to contend with expansive areas of unpatrolled land between POEs. Except for the Finnish border, there is no widely established individual border system in the land context with the capability to fully regulate the movement of people and goods. Borders can also have many natural obstacles and rough terrain that can impede border security operations. Furthermore, infrastructure such as roads and physical barriers can be damaged over time and require repair. In an interview with border expert and former CBP official Edgar Ramirez, he stated that many smuggling networks take advantage of rugged and difficult to patrol areas.<sup>15</sup> Also, maritime cargo inspection is generally less supervised because of the difficulty of monitoring long coastlines and large shipments.<sup>16</sup>

<sup>11</sup> Daniel M. Gerstein et al., *Managing International Borders: Balancing Security with the Licit Flow of People and Goods* (Santa Monica, CA: RAND, 2018), <https://www.rand.org/pubs/perspectives/PE290.html>; Randall Hansen and Demetrios Papademetriou, *Securing Borders*, (Washington, D.C.: Migration Policy Institute, 2014), <https://www.migrationpolicy.org/sites/default/files/publications/BadActors-Hansen-PapademetriouFINALWEB.pdf>.

<sup>12</sup> Global Counterterrorism Forum, "Good Practices in the Area of Border Security and Management in the Context of Counterterrorism and Stemming the Flow of Foreign Terrorist Fighters," September 22, 2011, <https://www.thegctf.org/Portals/1/Documents/Framework%20Documents/2016%20and%20before/GCTF-Good-Practices%20-BSM-ENG.pdf?ver=2016-09-13-124953-540>.

<sup>13</sup> Kaufman and Kray, "Worldwide Governance Indicators," World Bank, 2023.

<sup>14</sup> The Global Organized Crime Index, "About the Index," 2023, <https://ocindex.net/about>.

<sup>15</sup> Edgar Ramirez (former DHS and CBP and expert on US-Mexico Border), in discussion with the authors, February 2024.

<sup>16</sup> Ibid.

Countries should focus on “shrinking the border” and set up a multifaceted approach.<sup>17</sup> This can be done using basic specialized equipment, geolocation technologies, operational mobility strategies and patrol vehicles, and intelligence analysis capabilities. Front-line personnel should be provided with a variety of tools to help them communicate, access, and survey large stretches of borders that may include rugged terrain. These border guards can be supported through automated scanners, as well as intelligence techniques that can identify the most high-risk areas of borders.

## **Best Practices:**

### **1. Basic Specialized Equipment**

This section identifies a capability toolkit of useful equipment and technology for border strategy. Broadly, this includes portable equipment for border guards, surveillance installations, and mobility capabilities.

When patrolling the border, border guards should be equipped with a variety of different specialized gear including night-vision goggles, binoculars, non-cooled thermal cameras, cooled thermal cameras, carbon dioxide detectors, heartbeat detectors, fingerprint scanners, and smart deck cameras (SDCAM).<sup>18</sup> These technologies help give border guards the best chance at detecting illegal border crossings and determining their risk level. Border guards should also have appropriate garments for the job and weather conditions. In countries where border guards only have one uniform, providing coveralls helps them be less averse to searching under vehicles and dirtying their only uniforms.<sup>19</sup>

To cover large distances, it is vital for border guards to have quiet and efficient transportation equipment. This can include patrol boats (offshore and coastal), trucks, off-road vehicles, and all-road vehicles.<sup>20</sup> Aerostats, helicopters, planes, drones, and other aerial vehicles are also useful for quickly covering large areas, however, many of them are restricted by weather and are expensive.<sup>21</sup> Furthermore, canine teams are an effective and relatively inexpensive strategy that require no high-tech equipment. Once trained, the dogs are very accurate, however, in hot climates they require many breaks.<sup>22</sup> Combined aerial, vehicle and foot patrols are very valuable.<sup>23</sup> As suggested by former CBP Chief, Raul Ortiz, countries should utilize patrols with changing schedules and routes, so smugglers cannot track guard movements between POEs.<sup>24</sup>

---

<sup>17</sup> Raul Ortiz, discussion with authors.

<sup>18</sup> Frontex, “Management Board Decision 18/2022 of 16 March 2022,” March 16, 2022, [https://prd.Frontex.europa.eu/wp-content/uploads/mb-decision-18\\_2022-on-technical-equipment\\_deployed-in-fx-coordinated-activities-in-2023.pdf](https://prd.Frontex.europa.eu/wp-content/uploads/mb-decision-18_2022-on-technical-equipment_deployed-in-fx-coordinated-activities-in-2023.pdf).

<sup>19</sup> Export Control and Related Border Security Program Officials (U.S. Department of State), in discussion with the authors, February 2024.

<sup>20</sup> Frontex, “Management Board Decision 18/2022 of 16 March 2022,” Bonnie Berkowitz, Shelly Tan and Kevin Uhrmache “Beyond the Wall: Dogs, Blimps and Other Things Used to Secure the Border.”

<sup>21</sup> Bonnie Berkowitz, Shelly Tan and Kevin Uhrmache “Beyond the Wall: Dogs, Blimps and Other Things Used to Secure the Border.”

<sup>22</sup> Ibid.

<sup>23</sup> Raul Ortiz, discussion with authors.

<sup>24</sup> Ibid.

To cover large areas with fewer personnel, countries can utilize a range of sensors. Unattended ground sensors that are buried in the ground can use seismic, acoustic, or infrared technology to detect unauthorized crossings.<sup>25</sup> They can patrol a wide area and are helpful in rugged terrain. When using this technology, it is important that sensors are concealed and moved frequently to ensure they maintain a high level of performance and avoid detection by potential threats. Mobile surveillance systems are also good for operating in extreme weather and terrain.<sup>26</sup>

Border guards also need to be able to securely communicate with each other and track their locations, across far distances. Utilizing a Common Operating Picture to actively monitor guard movements can enhance situational awareness and improve coordination. Each border guard should be equipped with encrypted communications capabilities, handheld radio equipment and GPS systems.

Case: On the U.S.-Mexico border, CBP deploys agents, aerial vehicles, predator drones, and sensors to patrol the border. There are more than 1,500 CBP canine teams and in the past few years, CBP has installed about 300 different types of surveillance towers on the Southwest border.<sup>27</sup> Since 2006, drones have patrolled the US-Mexico border. Currently, there are about 135 drones on the southern border and plans are in place to soon have 460.<sup>28</sup>

## 2. Geospatial and Signals Intelligence Collection and Analysis

Intelligence analysis can help target resources to different threats and help pre-position assets. Both signals intelligence analysis (SIGINT) and geospatial intelligence (GEOINT) can significantly improve border security. SIGINT involves collecting electronically transmitted data, particularly from communications and information systems. SIGINT technologies are useful for identifying threats before they cross the border, and for identifying communications emissions from potential targets during attempted illegal border crossings.

Additionally, GEOINT can help provide an overhead advantage to border guards through the exploitation and analysis of imagery, signals, and signatures with geospatial information. Satellite surveillance is a useful tool; however, it can be very expensive. Satellites are very technically sophisticated with sensors that can penetrate clouds, detect chemical traces, and provide high-resolution videos. This technology is being used by India on its disputed borders.<sup>29</sup> Australia also uses it to inform its maritime coast guard and successfully monitor its large coastline.<sup>30</sup>

---

<sup>25</sup> “High-Tech Border Security: Current and Emerging Trends,” IEEE Public Safety Technology Initiative, accessed April 4, 2024, <https://publicsafety.ieee.org/topics/high-tech-border-security-current-and-emerging-trends>.

<sup>26</sup> Bonnie Berkowitz, Shelly Tan and Kevin Uhrmacher “Beyond the Wall: Dogs, Blimps and Other Things Used to Secure the Border,” Washington Post, Feb 8, 2019, <https://www.washingtonpost.com/graphics/2019/national/what-is-border-security/>.

<sup>27</sup> Ibid; Russell Contrera, “The U.S. Is Using AI at U.S.-Mexico Border for Higher Surveillance,” Axios, December 12, 2023, <https://www.axios.com/2023/12/12/border-patrol-ai-us-mexico-wall-surveillance-virtual>.

<sup>28</sup> John Davis, “CBP Small Drones Program,” November 9, 2020, <https://www.cbp.gov/frontline/cbp-small-drones-program>.

<sup>29</sup> Society of Satellite Professionals International, “How Satellites Secure the Border,” Via Satellite, accessed April 4, 2024, <https://interactive.satellitetoday.com/how-satellites-secure-the-border/>.

<sup>30</sup> Ibid.

Even if a country cannot afford its own satellites, they can still receive useful data through agreements with partner countries with established and secure satellite programs, such as the U.S. Also, GEOINT is particularly useful because much of it can be shared through unclassified channels since it mostly consists of linking an image to a time and a location.<sup>31</sup> Even without gaining direct access to U.S. satellites, countries can still benefit from a variety of applications offered by the National Geospatial-Intelligence Agency (NGA). One standout application is MapCache.<sup>32</sup> The MapCache application “is an easy-to-use, cross-platform, self-service mobile or desktop application that transforms geospatial data into GeoPackages for on-the-go use in areas with limited or no connectivity.”<sup>33</sup> This product is especially useful for border guards in remote areas.

Managing a variety of streams of intelligence is an important capability. Multi-source intelligence analysis allows border agencies to gain the most comprehensive picture possible. The U.S. has successfully transferred Real Time Regional Gateway (RT-RG) technology from being a tactic used in Iraq to one that is helpful on borders. As explained on the NSA website, “RT-RG takes traditional streams of signals intelligence and combines it with information gathered from other sources, such as raids, satellite images, and on-the-ground reports related to enemy movements and operations.”<sup>34</sup> This allows groups to respond quickly to incoming information and target resources effectively.

## **Challenge 2: Range of Threats**

Some areas along borders are more susceptible to different types of arms and technology trafficking than others. There is a range of illicit technologies and arms transferred across borders including chemical, biological, radiological, and nuclear weapons (CBRN); SALW; illicit technologies; and dual-use materials. The threat posed by low-probability, but high-consequence CBRN materials is dire. Additionally, while SALW are less destructive than CBRN, they are more concealable and accessible. The geographic areas around the world most known for the production and illegal trafficking of SALW are the “Golden Crescent” of Pakistan, Afghanistan, and Iran, and the “Golden Triangle” of Myanmar, Thailand, Laos, and Vietnam.<sup>35</sup> New

---

<sup>31</sup> Michael Hales and Michael Wagner, “Stronger Together: Expanding Partnerships for Global Security,” National Geospatial-Intelligence Agency, October 1, 2017, [https://www.nga.mil/news/Stronger\\_together\\_Expanding\\_partnerships\\_for\\_globa.html](https://www.nga.mil/news/Stronger_together_Expanding_partnerships_for_globa.html).

<sup>32</sup> National Geospatial-Intelligence Agency, “NSA at the 2023 DoDIIS Worldwide Conference,” accessed April 4, 2024, [https://www.nga.mil/news/2023\\_DoDIIS\\_Worldwide\\_Conference.html](https://www.nga.mil/news/2023_DoDIIS_Worldwide_Conference.html).

<sup>33</sup> Ibid.

<sup>34</sup> “National Cryptologic Museum Debuts Service & Sacrifice, Real Time Regional Gateway Exhibit,” National Security Agency/Central Security Service, July 12, 2017, <https://www.nsa.gov/Press-Room/News-Highlights/Article/Article/1670296/national-cryptologic-museum-debuts-service-sacrifice-real-time-regional-gateway/http%3A%2F%2Fwww.nsa.gov%2FPress-Room%2FNews-Highlights%2FArticle%2FArticle%2F1670296%2Fnational-cryptologic-museum-debuts-service-sacrifice-real-time-regional-gatewa%2F>.

<sup>35</sup> Ibid.

technologies such as 3-D printed weapons have created a new threat that is very hard to track.<sup>36</sup> Finally, dual-use materials are uniquely difficult because of the challenges of allowing the open transport of commercial materials while mitigating the threats they may pose in the wrong hands.<sup>37</sup> There are similar, but slightly different challenges at mitigating risks at and between POEs. Managing the smooth flow of legitimate trade while detecting illicit activities at POEs can be difficult because while multiple levels of checks and extensive paperwork can mitigate risks, they also impede legitimate crossings and trade, fostering frustrations and incentivizing the circumvention of legal pathways.

### **Best Practices:**

#### **1. Multilayered Systems and Strategic Scanning at POEs**

The most secure countries set up multiple layers of checks at POEs. This can be facilitated using preclearance models, risk-based screening (RBS), and threat assessment software. The use of these different strategies along with expanding borders into multiple series of physical barriers, screening, and holding areas gives border officials multiple chances to find weapons and illicit technologies. It is important for countries to secure their borders while also facilitating the efficient flow of licit goods and people.

At POEs, a variety of scanners can be used to assist with processing cargo. There are highly sophisticated X-ray, gamma-ray, and other varieties of scanners. While equipment procurement can be expensive, requires training, and potentially slows down processing at the border, the scanners are very accurate. They can be used to find radiation and chemical weapons, as well as a variety of other contraband.

Other tools that countries can use for analyzing goods and people at POEs are the CBP's automated targeting system-global (ATS-G) and global travel assessment system (GTAS) software.<sup>38</sup> GTAS is frequently used with partners that have a less close relationship with the U.S. and involve less collaboration. As explained by CBP, both ATS-G and GTAS automatically scan "passenger manifests in real time to identify suspicious travelers or crew members who may pose a national security risk;" however, GTAS "permits foreign countries to independently perform vetting activities."<sup>39</sup> The WCO has been assisting with the deployment of GTAS to different countries. It is a free Advance Passenger Information (API) and Passenger Name Records (PNR)

---

<sup>36</sup> Andrea Edoardo Varisco, "The International Tracing Instrument: Examining Options to Support Operationalization," *Geneva: United Nations Institute for Disarmament Research (UNIDIR)*, January 1, 2018, [https://www.academia.edu/38151691/The\\_International\\_Tracing\\_Instrument\\_Examining\\_Options\\_to\\_Support\\_Operationalization](https://www.academia.edu/38151691/The_International_Tracing_Instrument_Examining_Options_to_Support_Operationalization).

<sup>37</sup> Dow Jones, "What are Dual-Use Goods?" accessed March 6, 2024 <https://www.dowjones.com/professional/risk/glossary/dual-use-goods-definition/>; "Dual-use goods: what are they and why are there new rules?" Multimedia Center, European Parliament, March 22, 2021, [https://multimedia.europarl.europa.eu/en/video/dual-use-goods-what-are-they-and-why-the-new-rules\\_N01-AFPS-210319-DUSE](https://multimedia.europarl.europa.eu/en/video/dual-use-goods-what-are-they-and-why-the-new-rules_N01-AFPS-210319-DUSE).

<sup>38</sup> Paul Koscak, "Working Together: Catching Smugglers, Terrorists and Lawbreakers Works Better Through Partnership," U.S. Customs and Border Protection National Targeting Center, accessed April 5, 2024, <https://www.cbp.gov/frontline/cbp-national-targeting-center>.

<sup>39</sup> Ibid.

System that can help reduce wait time at POEs.<sup>40</sup> These applications are readily accessible and should be taken advantage of by countries that are struggling with their own technical capabilities at POEs.

To increase efficiency, countries should consider implementing cargo and travel preclearance models.<sup>41</sup> These models are arrangements between two countries that allow customs and immigration officers from one partner country to be located at another country's POE to facilitate customs work.<sup>42</sup> The U.S. has had some success with implementing the cargo preclearance model to extend border security checks into neighboring countries such as Canada and some overseas countries.<sup>43</sup> Similarly, the travel preclearance model is widely used by the U.S. in Ireland, Aruba, UAE, Bahamas, and Canada that allows travelers to complete customs, immigration, and agriculture checks before they travel.<sup>44</sup> These models benefit public and private partners by improving both security and efficiency.

Additionally, countries should utilize RBS for identifying and analyzing threats. RBS is “a data-led assessment that will allow enhanced screening for those who represent a higher risk and a more seamless journey for those passengers that represent low risk.”<sup>45</sup> DHS agencies widely apply risk analysis in their systems for land, sea, and air POEs. Many of today's RBS models utilize facial recognition scanners to identify high-risk targets. Like preclearance models, this strategy facilitates legitimate trade without sacrificing security at POEs.

## 2. Risk Management Systems Along the Border

It is essential for countries to be able to effectively identify and prioritize threats to their borders. This is even more important in countries with limited resources and can be done through effective risk management. Many of the systems, practices, and types of technology mentioned above can be deployed along border areas between POEs to provide multilayered coverage. Multilayered risk management strategies create necessary redundancy in the border security system. This redundancy enhances resilience by ensuring that even if one layer is compromised, other layers remain in place to mitigate the risk of border security threats. The capability of national authorities to deploy these varies greatly depending on many of the factors discussed in this report.

Case: An example of effective risk analysis is Frontex's European Border Surveillance System (EUROSUR) which offers a framework for information exchange within the common

---

<sup>40</sup> Ibid.

<sup>41</sup> Laurie Trautman (Director of the Border Policy Research Institute at Western Washington University), in discussion with the authors, February 2024.

<sup>42</sup> Ibid.

<sup>43</sup> Jan Brock, “Understanding Cargo Preclearance,” Pacific Customs Brokers, June 2, 2022, <https://www.pcbusa.com/post/what-is-cargo-preclearance>.

<sup>44</sup> U.S. Customs and Border protection, “Frontline Preclearance,” January 4, 2024, <https://www.cbp.gov/frontline/frontline-preclearance>.

<sup>45</sup> EUR-Lex, “COUNCIL REGULATION (EC) No 2007/2004,” October 26, 2004, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32004R2007>; “Risk Based Screening for a More Secure Aviation Network,” Smiths Detection, April 25, 2023, <https://www.smithsdetection.com/insights/risk-based-screening-for-a-more-secure-aviation-network/>.

integrated risk analysis model (CIRAM).<sup>46</sup> This model defines risk as a function of threat. It also considers vulnerability and impact by measuring the likelihood of a threat. EUROSUR is part of various risk analysis networks such as the European Document Fraud Risk Analysis Network (EDF-RAN) and the Maritime Intelligence Community Risk Analysis Network (MIC-RAN).<sup>47</sup>

### 3. Adherence to International Agreements and Participation in Control Regimes

There are many international regimes, guidelines, and information available to countries about targeted responses for mitigating specific types of threats. Specifically, to improve a country's management of WMD, SALW, and dual-use materials, countries should refer to international treaties and guidance. In many cases, regional agreements and organizations can standardize the management of particular weapons, provide additional recommendations and facilitate multilateral action. By joining or increasing their involvement in these institutions, countries contribute to an expanding network and help manage illicit items beyond their borders. Improving the global management of illicit item transfers reduces the pressure on individual countries and their governments.

#### a. WMD

International agreements relating to WMD include the Nuclear Non-Proliferation Treaty (NPT), Chemical Weapons Convention (CWC), and the Biological Weapons Convention (BWC).<sup>48</sup> In particular for WMD, it is vital to educate border officials in training sessions on the identification and proper handling of different chemicals and materials that can be used to create CBRN weapons.<sup>49</sup> Guidance and training are offered by the WCO and the Organization for the Prohibition of Chemical Weapons (OPCW). The WCO's Strategic Trade Enforcement Program (STCE), specifically the *STCE Implementation Guide*, provides an in-depth description of CBRN of strategic concern, as well as detailing the specific customs codes corresponding to different types of materials.<sup>50</sup> Similarly, the OPCW and the WCO jointly organized an online training course on the enforcement of the Chemical Weapons Convention's chemical transfer regime for over 100 customs officers from 38 OPCW Member States.<sup>51</sup> These types of large-scale training

<sup>46</sup> Frontex, "Monitoring and Risk Analysis: CIRAM," accessed March 3, 2024, <https://www.Frontex.europa.eu/what-we-do/monitoring-and-risk-analysis/ciram/>.

<sup>47</sup> Frontex, "Risk Analysis: Strategic Risk Analysis," accessed March 3, 2024, <https://www.Frontex.europa.eu/what-we-do/monitoring-and-risk-analysis/risk-analysis/strategic-risk-analysis/#:~:text=Frontex%20Risk%20Analysis%20Network%20>.

<sup>48</sup> United Nations Office on Drugs and Crime, "The Firearms Protocol,"; United Nations Office for Disarmament Affairs, "Treaty on the Non-Proliferation of Nuclear Weapons (NPT)," accessed March 6, 2024, <https://disarmament.unoda.org/wmd/nuclear/npt/>; OPCW, "Chemical Weapons Convention," accessed March 6, 2024, <https://www.opcw.org/chemical-weapons-convention/>; United Nations Office for Disarmament Affairs, "Biological Weapons Convention," accessed March 6, 2024, <https://disarmament.unoda.org/biological-weapons/>.

<sup>49</sup> Alan Bersin, discussion with authors.

<sup>50</sup> World Customs Organization, *WCO Strategic Trade Control Enforcement Implementation Guide*, 2023, <https://www.wcoomd.org/en/topics/enforcement-and-compliance/instruments-and-tools/guidelines/wco-strategic-trade-control-enforcement-implementation-guide.aspx>.

<sup>51</sup> Organization for the Prohibition of Chemical Weapons, "OPCW and World Customs Organisation Train Customs Officers on Improving Control of International Transfer of Chemicals," 2020, <https://www.opcw.org/media-centre/news/2020/09/opcw-and-world-customs-organisation-train-customs-officers-improving>.



expositions allow for many different border officials to be trained simultaneously so that they may be able to disseminate the best practices to their own agencies. As a result of these programs, a high level of WMD border management is cohesively implemented across many countries.

**b. SALW**

As is the case for WMD and dual-use materials, to improve a country's SALW management, it can refer to international treaties and guidance. First, to define SALW, small arms are weapons designed for individual use, including revolvers, self-loading pistols, rifles and carbines, submachine guns, assault rifles and light machine guns.<sup>52</sup> Whereas, light weapons are weapons designed for use by two or three persons serving as a crew, including recoilless rifles, portable launchers of anti-tank missile and rocket systems.<sup>53</sup>

For SALW, metal detectors and other types of scanners can be useful at POEs; however, they are not enough. Countries need to jointly manage SALW in circulation to begin to limit their accessibility to bad actors. The UN Protocol against the Illicit Manufacturing of and Trafficking in Firearms, their Parts and Components and Ammunition (Firearms Protocol) is a legally binding treaty that obligates members to implement specific measures in the management of illicit SALW.<sup>54</sup> Additionally, the UN Programme of Action (PoA) to Prevent, Combat, and Eradicate the Illicit Trade in Small Arms and Light Weapons is an important international agreement with “commitments to enhance control measures over small arms, including through improved national regulations, stockpile management, import/export controls and international cooperation.”<sup>55</sup> For these UN efforts to be successful, states need to submit accurate national reports and adhere to their provisions.

For specific guidance, countries can utilize the UN Modular Small-arms-control Implementation Compendium (MOSAIC).<sup>56</sup> This practical tool has operational advice for countries to follow to improve their SALW control efforts in the form of a “set of voluntary, practical guidance notes that each combine the best small-arms expertise in succinct, operational advice.”<sup>57</sup> Additionally, a UN Institute for Disarmament Research (UNIDIR) report recommends that countries strengthen import marking efforts; provide training on accurate identification of weapons; utilize secondary markings; conduct “targeted capacity-building activities, focusing on high-risk and low-capacity environments;” and share tracing datasets allowing for a

---

<sup>52</sup> United Nations, “International Instrument to Enable States to Identify and Trace, in a Timely and Reliable Manner, Illicit Small Arms and Light Weapons,” <https://front.un-arm.org/wp-content/uploads/2021/03/International-Tracing-Instrument-six-official-languages.pdf>.

<sup>53</sup> Ibid.

<sup>54</sup> United Nations Office on Drugs and Crime, “The Firearms Protocol,” accessed April 30, 2024, <https://www.unodc.org/unodc/en/firearms-protocol/the-firearms-protocol.html>

<sup>55</sup> United Nations Office for Disarmament Affairs: Regional Centre for Peace and Disarmament in Asia and the Pacific, “Programme of Action,” September 27, 2013, <https://www.unrcpd.org/conventional-weapons/poa/>.

<sup>56</sup> United Nations Office for Disarmament Affairs, “Modular Small-Arms-Control Implementation Compendium (MOSAIC),” accessed March 3, 2024, <https://disarmament.unoda.org/convarms/mosaic/>

<sup>57</sup> Ibid.

“single-window” to quickly address requests.<sup>58</sup> These databases can also be shared regionally to trace weapons on a larger scale.

Case: Below the international level, there are many regional efforts focused on SALW challenges. One example of this is the Regional Centre on Small Arms and Light Weapons (RESCA) in the Great Lakes Region and the Horn of Africa. The center has successfully helped implement cohesive national legislations, spread marking equipment, facilitate the destruction of firearms, create a regional database, and improve tracing capabilities. RESCA demonstrates how shared efforts can be helpful in tackling illicit SALW challenges on a regional scale.

### *c. Dual-Use Materials*

Despite their prevalence in commercial society, countries should still try to map the most dangerous of dual-use materials.<sup>59</sup> Countries can join international export control regimes such as the Nuclear Suppliers Group (NSG), Wassenaar Arrangement (WA), Missile Technology Control Regime (MTCR) and the Australia Group (AG).<sup>60</sup> International export control regimes establish common standards and guidelines for regulating the export of dual-use materials and technologies. By aligning their export control policies with these standards, member states promote consistency and transparency in the international trade of dual-use items.

Tyler Hoffman noted that there is little economic incentive to monitor dual-use goods throughout their transit because they are, by definition, not particularly harmful a lot of the time.<sup>61</sup> Hoffman gave the example of thiodiglycol, a chemical used both in ballpoint pens and mustard gas.<sup>62</sup> Since they are widely produced and traded, one of the only ways to identify if shippers have negative intentions is through thorough training and prior intelligence on smuggling schemes.<sup>63</sup> Furthermore, AI and other advanced technologies can track the movement of materials with potential WMD uses.<sup>64</sup> Countries should also encourage more transparency in arms supply chains. National governments should develop supply chain security and establish technical descriptions of various technological threats by deploying some of these models.

## **4. Intelligence Sharing (within a national government, and with partner countries and organizations)**

Considering that it is impossible for every item that crosses borders to be scanned, countries need to rely on intelligence to preemptively identify high-risk individuals and groups before they even reach the border. This is made easier through intelligence sharing. Data sharing

---

<sup>58</sup> Andrea Edoardo Varisco, “The International Tracing Instrument: Examining Options to Support Operationalization.”

<sup>59</sup> Alan Bersin, discussion with authors.

<sup>60</sup> Paul Van Son (former Senior Advisor in the U.S. Department of State), in discussion with authors, March 2024; “Nuclear Suppliers Group,” accessed March 6, 2024. <https://www.nuclearsuppliersgroup.org/index.php/en/>; “The Wassenaar Arrangement,” 2015. <https://www.wassenaar.org/>; “MTCR,” accessed March 6, 2024. <https://www.mtc.info/de>; “The Australia Group,” accessed March 6, 2024. <https://www.dfat.gov.au/publications/minisite/theaustraliagroupnet/site/en/index.html>.

<sup>61</sup> Ibid.

<sup>62</sup> Ibid.

<sup>63</sup> Tyler Hoffman (Pacific Northwest National Laboratory), in discussion with the authors, March 2024.

<sup>64</sup> Ibid.

is a challenging process, especially in countries with varying information security capabilities and where border agencies are penetrated by criminal groups. Within a nation, cross-agency rivalries, compartmentalization, and a lack of organization can make it difficult to share intelligence between agencies. For the best results, it is important for countries to facilitate information sharing internally and with partner agencies abroad.

The U.S. Department of Defense (DOD) has programs to aid partner countries in developing intelligence networks.<sup>65</sup> Many other U.S. agencies readily provide intelligence assistance to partner countries as well, including DHS, the Department of Justice (DOJ), and the Central Intelligence Agency (CIA).<sup>66</sup> While there are many benefits to sharing intelligence, countries must take the time to settle on carefully negotiated agreements, standards, and systems. Intelligence sharing also requires partner countries to develop the capabilities for secure infrastructure to ensure that sensitive information does not become compromised. As explained by Alan Bersin, this is becoming easier through the development of federated learning technologies.<sup>67</sup> Federated learning is a machine learning approach that allows multiple entities to collaboratively train models without sharing raw data. Expanding this model provides an opportunity for increased cooperation to strengthen border security is a viable option on both a large and small scale, and on a country-to-country basis.<sup>68</sup>

Case: EUROSUR, as well as IBM, facilitate intelligence sharing across the EU.<sup>69</sup> EUROSUR provides geo-referenced near-real-time data and information received from different authorities, sensors, platforms, and other sources, which is transmitted across secured channels to be processed and selectively shared with other relevant authorities.<sup>70</sup> According to a report from the Commission to the European Parliament and Council on the Evaluation, it has been an effective system for data sharing, and its Fusion Center services have repeatedly helped fight cross-border crime.<sup>71</sup>

---

<sup>65</sup> Office of the Director of National Intelligence, “Collaboration,” INTEL, accessed March 19, 2024, <https://www.intelligence.gov/mission/our-values/344-collaboration>; Joseph Clark, “Intelligence Official Underscores Importance of Partnerships,” U.S. Department of Defense, November 1, 2023, <https://www.defense.gov/News/News-Stories/Article/Article/3576600/intelligence-official-underscores-importance-of-partnerships/>.

<sup>66</sup> *United States Foreign Intelligence Relationships: Background, Policy and Legal Authorities, Risks, Benefits*, May 15, 2019, <https://www.everycrsreport.com/reports/R45720.html>.

<sup>67</sup> Alan Bersin, discussion with authors.

<sup>68</sup> Mohanad Sarhan et al., “Cyber Threat Intelligence Sharing Scheme Based on Federated Learning for Network Intrusion Detection - Journal of Network and Systems Management,” SpringerLink, October 7, 2022, <https://link.springer.com/article/10.1007/s10922-022-09691-3>.

<sup>69</sup> The European Commission, “Commission Implementing Regulation (EU) 2021/581 of 9 April 2021 on the situational pictures of the European Border Surveillance System (EUROSUR),” EUR, April 12, 2021, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021R0581&qid=1618306409753>.

<sup>70</sup> The European Commission, “COMMISSION IMPLEMENTING REGULATION (EU) 2021/581 of 9 April 2021 on the situational pictures of the European Border Surveillance System (EUROSUR).”

<sup>71</sup> “Report From The Commission To The European Parliament And The Council on the Evaluation of the European Border Surveillance System (EUROSUR) Eurosur,” Migration and Home Affairs, September 12, 2018, [https://home-affairs.ec.europa.eu/policies/schengen-borders-and-visa/border-crossing/eurosur\\_en#:~:text=Report%20on%20the%20evaluation%20of%20EUROSUR](https://home-affairs.ec.europa.eu/policies/schengen-borders-and-visa/border-crossing/eurosur_en#:~:text=Report%20on%20the%20evaluation%20of%20EUROSUR).

Additionally, the EU's IBM four-tier access control model protects information while also sharing it with the necessary parties. It has been useful in providing the detection of cross-border crime; risk analysis; and cooperation with third countries.<sup>72</sup> As part of this system, each Member State receives access to a shared intelligence network that relays real-time information and threats to individual borders. Although data sharing in this integrated system is necessary, multiple audits of Frontex by the European Data Protection Supervisor (EDPS) have found weaknesses in its ability to securely store sensitive data.<sup>73</sup> This emphasizes the need for a secure database and mutual capabilities for sharing sensitive intelligence amongst partners.

## 5. Cross-Border Collaborative Border Management

Countries should collaborate with neighboring countries to share the burden of the border. For example, rather than thinking about it as the "U.S. border," it should be seen as the "U.S.-Mexico border." Countries should have a collaborative approach that includes mirrored patrolling and integrated information sharing systems. Cross-border multilayered systems should be compatible and include a dedication to informing each other of criminal syndicates and watch lists.<sup>74</sup> This can help share the costs as well as increase accountability and border secureness.

Case: An example of a failure to cross-border manage is the challenge of arms entering into Mexico in private vehicles from the U.S. without proper inspection.<sup>75</sup> Like most countries around the world, the U.S. border patrol does not inspect outbound traffic.<sup>76</sup> Mexico has refused over many years the option to deploy options for regular checks of incoming vehicles. To overcome this shortcoming, the U.S. needs to perform more consistent outbound checks or Mexico needs to increase its checks.<sup>77</sup> Although requiring more resources, this change would be beneficial to both the U.S. and Mexico. This failure demonstrates the need for searching outbound traffic through random, non-intrusive inspections, as well as coordination on both sides of a border.

Case: The free and secure trade, or FAST program is a joint effort between the Canada Border Services Agency (CBSA) and U.S. CBP that enhances border and trade chain security while making cross-border commercial shipments simpler and subject to fewer delays. CBSA and CBP work together to enhance border security, combat organized crime and terrorism, and prevent contraband smuggling.

### Challenge 3: Implementation and Governance

---

<sup>72</sup> The European Parliament and the Council of the European Union, "Regulation (EU) 2016/1624 of the European Parliament and of the Council," EUR, September 16, 2016, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016R1624>.

<sup>73</sup> European Data Protection Supervisor, *Audit Report*, October 6, 2022, [https://www.edps.europa.eu/data-protection/our-work/publications/audits/2023-05-24-audit-report-frontex\\_en](https://www.edps.europa.eu/data-protection/our-work/publications/audits/2023-05-24-audit-report-frontex_en).

<sup>74</sup> Raul Ortiz (25th Chief of the United States Border Patrol), in discussion with the authors, February 2024.

<sup>75</sup> Alan Bersin, discussion with authors.

<sup>76</sup> Ibid.

<sup>77</sup> Raul Ortiz, discussion with authors.

Many countries struggle with implementing border policy frameworks due to factors such as lack of political will, funding issues, corruption, and inefficient management, as highlighted by the World Bank.<sup>78</sup> While a nation may have robust border and export security laws in place, inadequate enforcement mechanisms or insufficient repercussions for violators may lead to risk exposures. Sarah Burkhard, principal researcher at the Institute for Science and International Security (ISIS), emphasizes the imperative to fix the gap between strong legislative strategies and weak implementation, necessitating significant organization, bureaucratic coordination, and internal checks.<sup>79</sup> Burkard noted that over 100 countries do not think they need export and border controls, leading to insufficient allocation of resources for border improvement.<sup>80</sup>

Furthermore, many countries face challenges because of corrupt or negligent border guards. Corruption undermines border security efforts. Inadequate funding can constrain the hiring and compensation of border guards, rendering them susceptible to bribery and decreasing morale. Addressing corruption is challenging due to its entrenched nature within organizational hierarchies and cultural norms, where livelihoods, local economies and familial protection may depend on accepting bribes at POEs.

Regardless of political considerations, resource disparities among countries significantly impact wages, personnel numbers, and infrastructure management. Limited financial resources often prevent investment in the newest surveillance technologies. The development of robust intelligence and analysis capabilities requires extensive investment in training, institution building, and data analysis tools. The U.S. will spend around \$25.9 billion on the CBP and Immigration and Customs Enforcement (ICE) core budget in FY 2025.<sup>81</sup> This is not a viable option for most EXBS partners. A related challenge is that sometimes high-tech equipment is not worth the price. There are many examples of high technologies being purchased by countries, and then being cast aside to collect dust. This can occur for a variety of reasons including insufficient training for managing high-tech equipment and a lack of incentives for border guards to remain in their posts.

## **Best Practices:**

### **1. Implement a National Action Plan (NAP)**

For effective border management, countries must first implement a comprehensive NAP focused on countering illicit arms transfers.<sup>82</sup> As emphasized by Tyler Hoffman from the Pacific Northwest National Laboratory, a NAP should encompass well-defined guidelines for implementation and “elaborate national priorities and facilitate coordination between national

---

<sup>78</sup> Kaufman and Kray, “Worldwide Governance Indicators,” World Bank, 2023.

<sup>79</sup> Sarah Burkhard and Spencer Faragasso (Researchers for the Peddling Peril Index (PPI)) in discussion with the authors, February 2024.

<sup>80</sup> Ibid.

<sup>81</sup> U.S. Department of Homeland Security, “Statement from Secretary Mayorkas on the President’s Fiscal Year 2025 Budget for the U.S. Department of Homeland Security,” March 11, 2024.

<sup>82</sup> World Customs Organization, *WCO Strategic Trade Control Enforcement (STCE) Implementation Guide*, 2023, <https://www.wcoomd.org/en/topics/enforcement-and-compliance/instruments-and-tools/guidelines/wco-strategic-trade-control-enforcement-implementation-guide.aspx>.

government agencies and key stakeholders, as well as with external partners and donors.”<sup>83</sup> When formulating a NAP, experts including former CBP Commissioner Bersin argue countries should begin by identifying and establishing governing standards and metrics for the specific threat being addressed.<sup>84</sup>

There are several guidelines for NAPs including the Centre for Armed Violence Reduction Guide.<sup>85</sup> Furthermore, following the implementation of the PoA, many countries have developed NAPs related to SALW including three European, four Latin American, and 14 sub-Saharan states.<sup>86</sup> Based on these sources and existing NAPs, a country’s NAP should include plans for the development of strong intelligence and analysis capabilities, anti-corruption strategies, means of targeting a variety of smuggled goods, and cooperation efforts among agencies.

As recommended by the UN Counterterrorism Forum (UNCCT), an inter-agency working group (IAWG), a NAP should focus on three key areas. First, it should prioritize the enhancement of security and border control standards at Points of Entry (POEs), which includes improving data management, processing, and protection protocols. Second, it should ensure the efficient flow of persons and goods at POEs, balancing security measures with the facilitation of legitimate travel and trade. Last, the NAP should address the coordination of procurement, encompassing the acquisition of modern technical equipment for checking travel documents, developing border infrastructure, and providing training and capacity building for personnel involved in border control at POEs.<sup>87</sup>

States should also use Strengths, Weaknesses, Opportunities, and Threats/Risks Analysis (SWOT) and other decision analysis tools. As explained by the UNCCT, “SWOT analyses are aiming to identify the key factors, both internal and external, seen as important to enhance effective and efficient border security and management.”<sup>88</sup> These tools help define the current and projected border management situation and provide an opportunity to analyze the situation against known good practices. The identification of strengths and weaknesses reveal aspects of a country’s national BSM structure that give it either an advantage or disadvantage relative to other countries, respectively. Furthermore, opportunities include elements that the national BSM structure could exploit to its advantage, while threats refer to elements in the environment that

---

<sup>83</sup> Tyler Hoffman, discussion with the authors; Small Arms Survey, “Taking Stock of Action on the Illicit Small Arms Trade: National Action Plans as a Strategic Tool...,” Medium, June 22, 2020, <https://smallarmssurvey.medium.com/taking-stock-of-action-on-the-illicit-small-arms-trade-national-action-plans-as-a-strategic-tool-cdbb288905e1>.

<sup>84</sup> Alan Bersin, February 2024.

<sup>85</sup> Philip Alpers, “Implementing the Arms Trade Treaty and the Unpoa: A Guide to Coordinating an Effective Arms Control System,” November 1, 2017, <https://doi.org/10.6084/m9.figshare.5441200.v1>. [e-UNPoA-A-Guide.pdf](https://doi.org/10.6084/m9.figshare.5441200.v1).

<sup>86</sup> SIPRI, “Arms Transfer and SALW Control-Related Assistance in the Middle East and North Africa: Identifying Needs and Bridging Gap,” December 6, 2022, <https://www.sipri.org/commentary/topical-background/2022/arms-transfer-and-salw-control-related-assistance-middle-east-and-north-africa-identifying-needs-and-bridging-gap>.

<sup>87</sup> Global Counterterrorism Forum, “Good Practices in the Area of Border Security and Management in the Context of Counterterrorism and Stemming the Flow of ‘Foreign Terrorist Fighters,’” September 22, 2011, <https://www.thegctf.org/Portals/1/Documents/Framework%20Documents/2016%20and%20before/GCTF-Good-Practices%20-BSM-ENG.pdf?ver=2016-09-13-124953-540>.

<sup>88</sup> Ibid.

could impede the national BSM structure. For example, the Global Counterterrorism Forum utilizes a force-field analysis table to describe the positive and negative aspects that influence national border services and BSM focused on mitigating the threat of SALW and illicit technologies traveling through POEs.<sup>89</sup>

## 2. Multi-Focused Training

The training of border guards is essential to ensuring that there is efficient movement through POEs, effective use of advanced technologies, and accurate analysis. Basic training provides education on best customs practices regarding how to record data, patrol, inspections, and tactical operations. For example, Frontex’s Practical Handbook for Border Guards offers a step-by-step approach to daily security inspections and the overall modus operandi.<sup>90</sup> Additionally, the EU’s Interagency Training Manual for the Support and Coordination of Integrated Border Management (IBM) Strategies explains different methods of successful training methods for trainers. It describes the “training needs assessment,” which allows agencies to identify which critical areas require training.<sup>91</sup> It also addresses the necessity of proper technological training so that border officials are able to correctly use the technologies provided, as well as the need to address language barriers when conducting group training exercises.<sup>92</sup> By following examples and guidelines already put into practice by countries or groups of countries, training programs may be more effective.

Another recommended practice is to have border guards train with representatives from other military, intelligence, law enforcement, and internal security groups to improve border security.<sup>93</sup> External training can also be facilitated by international partners and organizations like INTERPOL, the 1540 Committee, the U.S. DOJ’s International Criminal Investigative Training Assistance Program (ICITAP), EXBS and Frontex.<sup>94</sup> To ensure the training is effective, states can perform frequent cross-agency reviews of programs. This helps maintain efficiency and measure performance over time. For example, a 2007 report by the U.S. Government Accountability Office (GAO) examines the effectiveness of the U.S. CBP basic training program and the extent to which it has developed and improved the efficiency of its basic training program.<sup>95</sup>

---

<sup>89</sup> Global Counterterrorism Forum, “Good Practices in the Area of Border Security and Management in the Context of Counterterrorism and Stemming the Flow of ‘Foreign Terrorist Fighters,’” September 22, 2011, <https://www.thegctf.org/Portals/1/Documents/Framework%20Documents/2016%20and%20before/GCTF-Good-Practices%20BSM-ENG.pdf?ver=2016-09-13-124953-540>.

<sup>90</sup> The European Commission, Practical Handbook for Border Guards, October 28, 2022, [https://home-affairs.ec.europa.eu/system/files/2022-11/Practical%20handbook%20for%20border%20guards\\_en.pdf](https://home-affairs.ec.europa.eu/system/files/2022-11/Practical%20handbook%20for%20border%20guards_en.pdf).

<sup>91</sup> The European Union’s CARDS Regional Program, Inter-agency training manual, accessed March 19, 2024, [https://www.icmpd.org/file/download/48682/file/IBM\\_Regional\\_Inter-agency\\_Training\\_Manual\\_new\\_-\\_English.pdf](https://www.icmpd.org/file/download/48682/file/IBM_Regional_Inter-agency_Training_Manual_new_-_English.pdf).

<sup>92</sup> Ibid.

<sup>93</sup> Gerstein et al., *Managing Borders*.

<sup>94</sup> Interpol, “Radiological and Nuclear Prevention Activities,” accessed March 3, 2024, <https://www.interpol.int/en/Crimes/Terrorism/Radiological-and-Nuclear-terrorism/Radiological-and-nuclear-prevention>.

<sup>95</sup> U.S. Government Accountability Office, “Homeland Security: Information on Training New Border Patrol Agents,” Homeland Security: Information on Training New Border Patrol Agents | U.S. GAO, March 30, 2007, <https://www.gao.gov/products/gao-07-540r>.

### 3. Anti-Corruption Strategies

Successful countries' anti-corruption policies are implemented by multiple agencies and offices, use technology to monitor behavior, and are continually evolving to improve results. The WCO's Anti-Corruption and Integrity Promotion (A-CIP) Program for Customs and the *Revised Arusha Declaration concerning Good Governance and Integrity in Customs* outline anti-corruption strategies for border security. These documents recommend the establishment of a cohesive regulatory framework in the form of laws, regulations, administrative guidelines, and procedures; appropriate use of automation and computerization; monitoring control systems for audits and investigations; a code of conduct; and human resource management policies.<sup>96</sup> Additional recommendations include the development of a legal and regulatory framework with a clear anti-corruption policy; institutional mechanisms to report corruption; and adequate human resources and training, including livable salaries along with merit-based hiring and firing practices.<sup>97</sup> Many aid programs focus on fighting corruption, but it can be difficult to determine if a corruption policy is working or if it is being applied well.<sup>98</sup> Implementing monitoring equipment such as cameras and drones that broadcast to remote, independent intelligence centers can disincentivize corrupt activities. Similarly, independent inspector generals and internal affairs units are essential for investigating questionable behavior.

### 4. Support from Assistance Providers (including other countries and international organizations)

Partner states should utilize their access to international resources to develop a diverse portfolio of support. In addition to gaining support from EXBS, states can look to other providers such as the EU. The EU has launched a variety of initiatives including EU P2P, Conventional Arms Export Control Outreach Project (COARM OP), and EU iTrace.<sup>99</sup> The COARM OP works

---

<sup>96</sup> World Customs Organization, "The Anti-Corruption and Integrity (A-CIP) Programme," accessed March 3, 2024, <https://www.wcoomd.org/en/topics/capacity-building/activities-and-programmes/cooperation-programmes/acip-programme.aspx>; World Customs Organization, "The Revised Arusha Declaration: Declaration of the Customs Co-operation Council concerning Good Governance and Integrity in Customs," 2003, <https://rad.wcoomd.org/>.

<sup>97</sup> European Commission, "Guidelines for Integrated Border Management in European Commission External Cooperation," 2010, <https://www.icmpd.org/file/download/48280/file/Guidelines%2520for%2520Integrated%2520Border%2520Management%2520in%2520European%2520Commission%2520External%2520Cooperation%2520EN.pdf>. Reference is made to the UN General Assembly, United Nations Convention Against Corruption, A/58/422 (31 October 2003) that addresses prevention, criminalization, and law enforcement measures, international cooperation, asset recovery, and technical assistance and information exchange. Reference is also made to relevant technical assistance available from the United Nations Office on Drugs and Crime (UNODC) such as the UNODC Anti-Corruption Tool Kit (see also: <https://www.unodc.org/unodc/en/corruption/>).

<sup>98</sup> Ambassador Earl Anthony Wayne, in discussion with the authors, April 2024.

<sup>99</sup> Chemical, Biological, Radiological and Nuclear Risk Mitigation, "Arms Trade Control," accessed March 6, 2024, [https://cbrn-risk-mitigation.network.europa.eu/eu-p2p-export-control-programme/arms-trade-control\\_en](https://cbrn-risk-mitigation.network.europa.eu/eu-p2p-export-control-programme/arms-trade-control_en); Giovanna Maletta and Lauriane Héau, "Arms Transfer and SALW Control-Related Assistance in the Middle East and North Africa: Identifying Needs and Bridging Gaps," Stockholm International Peace Research Institute, December 6, 2022, <https://www.sipri.org/commentary/topical-backgrounder/2022/arms-transfer-and-salw-control-related-assistance-middle-east-and-north-africa-identifying-needs-and>.



to improve “arms export controls in non-EU countries through several activities, such as national, regional or cross-regional workshops, study visits and, since 2020, remote assistance.”<sup>100</sup> Many countries in the Middle East and North Africa have benefited from this initiative, particularly in the management of SALW.

Assistance providers often vary on a case-by-case basis, depending on the internal political climate. In addition to this, a change of administration can significantly impact the amount of aid being provided. In these cases, EXBS and their partner countries should work together to ensure that help is being facilitated in a variety of ways from a range of donors. Projects should be coordinated between organizations to facilitate learning and establish common norms. Through multinational efforts, countries can effectively “peer pressure” each other into improving border programs and help confront political foibles.<sup>101</sup>

## 5. Procurement Strategies

Countries must determine the technologies that best fit their budget and areas of interest. When deciding on the types of technologies to use in a country, it can be helpful to look at what other countries have done. This information’s relevance is slightly hindered because every country has different borders with different challenges; however, examining another country’s border management and security plan can still provide insights about best practices and problems to avoid. Successful multilayered border capabilities are viewable in the Frontex Management Board Decision 18/2022 list of minimum number of technical and rapid reaction equipment to be deployed during operations in EU border states in 2023.<sup>102</sup> In this decision, Frontex deployed approximately 40 radiation detectors, four drug and explosive detectors, as well as a variety of other equipment, in each of its deployment periods.<sup>103</sup>

It is important that countries have a clear acquisition plan with specific capability expectations. To help identify the best technological solution, countries should employ independent technological consultants. Performing thorough market research and exploring both traditional and non-traditional private partners can ensure that their partner country is making the best decision possible. When deploying equipment, the EU’s border service states the first step is to fulfill the requirements of operational suitability, deployment capacity, and cost efficiency.<sup>104</sup> Throughout the entire process of procurement, countries need to actively manage the process to ensure that deadlines and performance expectations are being met.

When purchasing technologies, countries should consider the possible risks of investing lots of resources into devices that may not perform as well as expected. Often, there are

---

<sup>100</sup> Giovanna Maletta and Lauriane Héau, “Arms Transfer and SALW Control-Related Assistance in the Middle East and North Africa: Identifying Needs and Bridging Gaps.”

<sup>101</sup> Sarah Burkhard and Spencer Faragasso, February 2024.

<sup>102</sup> Frontex, “Management Board Decision 18/2022 of 16 March 2022”; Statewatch, “Frontex: Equipment Requirements for 2023 Include ‘Lethal and Non-Lethal Weapons,’” April 21, 2022, <https://www.statewatch.org/news/2022/april/eu-Frontex-equipment-requirements-for-2023-include-lethal-and-non-lethal-weapons/>.

<sup>103</sup> Frontex, “Management Board Decision 18/2022 of 16 March 2022.”

<sup>104</sup> Ibid.

cost-effective, basic solutions available that can be extremely efficient. For example, recording the volume and frequency of physical footprints at border areas effectively monitors foot traffic without high-tech equipment. An increase in footprints at certain POEs can be correlated with weakened security and physical barriers at specific points along a border.<sup>105</sup>

Case: The George Bush administration invested in advanced scanning equipment on a bridge in Tajikistan.<sup>106</sup> Unfortunately, no one used this technology. It ended up being a waste of money because the border guards were not trained on using it and thus used it for things like coffee tables and TV stands.<sup>107</sup> Many border officers have limited education and do not have the resources to undergo months of training. In these cases, it is more to use user-friendly technology. This case highlights how a proper examination of the needs and capabilities of a border agency must be completed before providing support. This assessment can be included in a NAP or performed by third-party agencies. After implementing technologies, regular, systematic audits should be conducted to determine the success of using such technologies.<sup>108</sup>

Case: With a strong organizational framework, states can avoid making the same mistakes made in the U.S. SBInet project. This project was a multi-billion-dollar effort by the DHS to dramatically increase the amount of technology on the U.S.-Mexico border. The project was launched in 2005 and was supposed to create a “virtual fence.”<sup>109</sup> The project was terminated in 2011, and it failed largely due to poor acquisition planning and insufficient project management.<sup>110</sup> There were many issues including cost overruns, delays, and performance issues with the technologies in extreme temperatures and rough terrain. The DHS Office of Inspector General (OIG) report concluded that “SBInet clearly illustrates that poorly defined and documented operational requirements, and failure to adequately plan, results in missed milestones and wasted resources.”<sup>111</sup> New large-scale border projects require significant oversight, continual management, and coordination with contractors.

#### **Challenge 4: Barriers to Cooperation**

Some countries have a general distrust of their neighbors and international partners, making it difficult to collaborate and share information. Most importantly, neighboring countries

---

<sup>105</sup> Ibid.

<sup>106</sup> Raul Ortiz, discussion with authors.

<sup>107</sup> Ibid.

<sup>108</sup> Alan Bersin, discussion with authors.

<sup>109</sup> American Immigration Council, “Looking For a Quick Fix: The Rise and Fall of the Secure Border Initiative’s High-Tech Solution to Unauthorized Immigration,” April 15, 2010

[https://www.americanimmigrationcouncil.org/sites/default/files/research/SBInet - Looking for a Quick Fix\\_041510.pdf](https://www.americanimmigrationcouncil.org/sites/default/files/research/SBInet_-_Looking_for_a_Quick_Fix_041510.pdf).

<sup>110</sup> U.S. Department of Homeland Security, *SBInet Program Program-Specific Recovery Act Plan*, May 15, 2009, [https://www.dhs.gov/xlibrary/assets/recovery/CBP\\_SBInet\\_Program\\_Final\\_2009-05-15.pdf](https://www.dhs.gov/xlibrary/assets/recovery/CBP_SBInet_Program_Final_2009-05-15.pdf).

<sup>111</sup> U.S. Department of Homeland Security Office of Inspector General, *Special Report: Lessons Learned from Prior Reports on CBP’s SBI and Acquisitions Related to Securing our Border*, June 12, 2017 <https://www.oig.dhs.gov/sites/default/files/assets/2017/OIG-17-70-SR-Jun17.pdf>.

must recognize where their territorial boundaries are before any improvement in border security can begin. In places where there is an established border, there may still be tensions due to lack of trust, diplomatic rifts, and personality differences, all of which make information sharing difficult. Without cross-border information sharing and collaboration, smugglers and potential threats are more easily able to transfer weapons undetected. The same is true for internal rifts and the lack of communication between a state's own law enforcement and border agencies. As between nations, collaboration between internal agencies can be challenging as it usually involves changing the communication culture of specific agencies. There are many challenges to vetting trusted partners and barriers to sharing classified information.

### **Best Practices:**

#### **1. External Support by Third-Party Countries and International Organizations**

In countries with disputed or volatile borders, international organizations and third parties can play an intermediary role in building trust, increasing communication channels, organizing joint training efforts, initiating data sharing, and facilitating a functioning border with POEs. International groups and countries such as the U.S. can provide support to better secure a contested border. These best practices can help countries recognize that security is a shared effort and collaboration is mutually beneficial.

Third-party arbitrators can help defuse tension and provide needed mediation to both small and large conflicts. This can also be done through country offices such as EXBS, as well as through other international and regional assistance providers. Buffer zones and external border support can help facilitate organized cross-border trade and prevent escalation. Additionally, if countries receive border support from similar organizations, they can indirectly work together. Although this is not an ideal situation, it can be a jumping-off point. Third party intermediaries can also offer incentives for cooperation on shared security concerns.<sup>112</sup>

Case: The United Nations Office on Drugs and Crime (UNODC) has developed a border liaison office (BLO) network in Southeast Asia to address the risks of transnational crime in the Mekong Subregion. BLOs encourage cross-border cooperation through improving capacities for data sharing, providing support for law enforcement agencies, and promoting effective cross-border communication.<sup>113</sup>

Case: In Cyprus, the United Nations (UN) has been a key factor in maintaining a fairly stable border between the Republic of Cyprus (RoC) and the Turkish Republic of Northern Cyprus (TRNC). In this particular case, where territorial boundaries are not mutually recognized and sovereignty is not respected, there are many obstacles in securing the border. Created in 1974 in the wake of a Turkish military invasion, the buffer zone is monitored by the United Nations

---

<sup>112</sup> Alice Buoli, and Oana Cristina Țiganea, Springer, *Territorial Fragilities in Cyprus : Planning and Preservation Strategies*, 2023, *ProQuest Ebook Central*, [http://ebookcentral.proquest.com/lib/aui/detail\\_action?docID=30754223](http://ebookcentral.proquest.com/lib/aui/detail_action?docID=30754223).

<sup>113</sup> United Nations Office on Drugs and Crime, "Responses: Border Liaison Office (BLO) Network," accessed February 25, 2024, [http://asia.aidforum.org/docs/Gerson\\_Bergeth.pdf](http://asia.aidforum.org/docs/Gerson_Bergeth.pdf).

Peacekeeping Force in Cyprus (UNFICYP).<sup>114</sup> According to a Global Organized Crime Index report, Cyprus faces challenges from illicit firearms transfers originating from the TRNC.<sup>115</sup>

Even in a case as unique as this, the RoC and TRNC have found ways to collaborate through third parties. The UN and other groups have been able to help monitor the contested border zones for incidents, keep an eye on both parties and facilitate licit movement/trade through POEs. This buffer zone includes border checks and document processing, even though the TRNC is not internationally recognized. Support from the UN and U.S. have also facilitated joint RoC and TRNC training activities and opportunities for cooperation on maritime security through the Center for Land, Open Seas and Port Security (CYCLOPS) facility.<sup>116</sup> The RoC's decision to collaborate with an international body to facilitate the continuation of trade and travel on the island has been essential to the communities that live there.

## 2. Collaboration and Information Sharing Among Internal Agencies

Agencies can increase cooperation by increasing joint activities and reviewing existing guidelines for coordinated border management. Regular joint meetings between agencies are a viable option to encourage greater intelligence sharing and create points of contact to facilitate collaboration.<sup>117</sup> These types of regular meetings can be established within a NAP and continued through successful, collective border management. Additionally, countries can review the methods for improving partnerships between law enforcement agencies and customs authorities that are found in organizations and resources such as INTERPOL and the WCO's *Customs-Police Cooperation Handbook* offer.<sup>118</sup> The handbook outlines mechanisms for fostering cooperation, including deployment of liaison officers and facilitation of officer exchanges.<sup>119</sup> It also highlights ongoing initiatives aimed at bolstering cooperation in international border management, such as the UNODC Container Control Program (CCP).<sup>120</sup> Furthermore, the European Commission's *Guidelines for Integrated Border Management (IBM) in European Commission External Cooperation* provides comprehensive insight into border management cooperation efforts in terms of inter-service, inter-agency, and international cooperation efforts, overviewing European coordinated border management procedures and best practices for each.<sup>121</sup>

---

<sup>114</sup> Ibid.

<sup>115</sup> The Organized Crime Index, "Criminality in Cyprus," accessed April 12, 2024, <https://ocindex.net/country/cyprus>.

<sup>116</sup> United Nations: Office on Drugs and Crime, "UNODC Supports New Cyprus Training Centre for Tackling Maritime Crime in the Eastern Mediterranean," July 14, 2022, <https://www.unodc.org/unodc/en/frontpage/2022/July/unodc-supports-new-cyprus-training-centre-for-tackling-maritime-crime-in-the-eastern-mediterranean.html>.

<sup>117</sup> Ambassador Earl Anthony Wayne, in discussion with the authors, April 2024.

<sup>118</sup> INTERPOL and the World Customs Organization, *Customs-Police Cooperation Handbook*, 2018, [https://cites.org/sites/default/files/eng/prog/enforcement/CustomsPoliceCoopHandbook\\_EN\\_LR.pdf](https://cites.org/sites/default/files/eng/prog/enforcement/CustomsPoliceCoopHandbook_EN_LR.pdf).

<sup>119</sup> Ibid.

<sup>120</sup> Ibid.

<sup>121</sup> European Commission, *Guidelines for Integrated Border Management in European Commission External Cooperation*, 2010, <https://www.icmpd.org/file/download/48280/file/Guidelines%2520for%2520Integrated%2520Border%2520Management%2520in%2520European%2520Commission%2520External%2520Cooperation%2520EN.pdf>.

### 3. Joint Training Sessions and Open-Source Intelligence (OSINT) Sharing

Some early steps that agencies can take to increase collaboration are joint training and open-source intelligence (OSINT) efforts. Alan Bersin explains how teams and countries that train together will inevitably build stronger relationships, which will greatly help the broader BSM on both sides.<sup>122</sup> These types of collaborative training sessions are usually hosted by international organizations and a group of partner countries. Additionally, using a common set of best practices during joint training sessions is useful for identifying weapons and dual-use goods and ensuring uniformity across border systems.<sup>123</sup>

Utilizing OSINT is a great option for countries because it is cost-effective, and easier to establish than using classified networks, making it more easily shareable. For example, Latin American countries can use open-source databases such as the SALW Dashboard created by the Regional Coordinator for Social and Economic Research (CRIES) for Latin America to monitor smuggling networks. This database tracks “the usage, seizure, and trafficking of SALW in the region.” It is important to note that although OSINT is valuable and readily available, there are limitations to the extent of information that can be shared without putting time-sensitive intelligence at risk. Sharing of classified information for maximal cooperation can only be facilitated once trust is established between partners.<sup>124</sup>

### Conclusions

Due to the ever-changing and diverse realities of border security, there is no one set of metrics or best practices that can be applied to all borders; however, there are several generally applicable factors that are useful for determining how secure a border is. These efforts include:

- 1) Establishing a multilayered approach;
- 2) Building a NAP that addresses the mitigation of illicit weapons and technology transfers as well as promoting internal cooperation amongst border and law enforcement agencies;
- 3) Participating in cooperation partnerships and membership in relevant international and regional organizations;
- 4) Striving to meet well-defined threat mitigation objectives with effective use of the resources available;
- 5) Regularly looking for ways to improve and establish new best practices to meet changing threats.

It is important to note that there are still many unknowns given the lack of independent border security reports and publicly available information on border agencies around the world.

---

<sup>122</sup> Alan Bersin, discussion with authors.

<sup>123</sup> Frontex, “Standing Corps: Courses,” accessed March 18, 2024, <https://www.Frontex.europa.eu/about-Frontex/standing-corps/courses/#:~:text=Course%20on%20Integrated%20Border%20Management&text=Also%2C%20the%20training%20is%20tailored,course%20is%20delivered%20to%20the> [m](#).

<sup>124</sup> Michael E. DeVine, *United States Foreign Intelligence Relationships: Background, Policy and Legal Authorities, Risks, Benefits*, Congressional Research Service, May, 15, 2019, <https://www.everycrsreport.com/reports/R45720.html>.

However, by using these widely applicable areas to first evaluate existing border strategy and management practices, countries can implement best practices as necessary to improve border security. Once these are considered, case-specific metrics and practices can also be examined.

Border security problems are also constantly evolving, as demonstrated by the more than 1,000 drones per month crossing into U.S. airspace near the border with Mexico.<sup>125</sup> Responses to this development have already included calls for no-fly zones for drones to be established along the U.S. borders. The trend of increased use of technologically advanced tactics and approaches, such as biometrics, unmanned patrols, and artificial intelligence by both smugglers and border agencies will additionally continue to change how borders look and function.

By conducting routine audits to identify vulnerabilities, adhering to the recommendations of successful border management, and holding regular internal reviews, countries can address these evolving threats and update their strategies and metrics to better meet the needs of their unique borders.

---

<sup>125</sup> Victor Nava, “Air Force General Reveals ‘Alarming’ Number of Drones Crossing into US Airspace at Southern Border,” New York Post, March 15, 2024, <https://nypost.com/2024/03/15/us-news/air-force-general-reveals-alarming-number-of-drones-crossing-into-us-airspace-at-southern-border/>.

## Bibliography

- Albright, David, Sarah Burkhard, Spencer Faragasso, and Linda Keenan. *The Peddling Peril Index (PPI) 2021/2022: Ranking National Strategic Trade Controls*. Washington, D.C.: Institute for Science and International Security, September 2021.  
[https://isis-online.org/uploads/isis-reports/documents/ThePeddlingPerilIndex2021\\_POD\\_wCover.pdf](https://isis-online.org/uploads/isis-reports/documents/ThePeddlingPerilIndex2021_POD_wCover.pdf).
- Alpers, Philip. "Implementing the Arms Trade Treaty and the UNPoA: A Guide to Coordinating an Effective Arms Control System." Figshare. November 1, 2017.  
<https://doi.org/10.6084/m9.figshare.5441200.v1>.
- American Immigration Council. "Looking For a Quick Fix: The Rise and Fall of the Secure Border Initiative's High-Tech Solution to Unauthorized Immigration." April 15, 2010.  
[https://www.americanimmigrationcouncil.org/sites/default/files/research/SBInet\\_-\\_Looking\\_for\\_a\\_Quick\\_Fix\\_041510.pdf](https://www.americanimmigrationcouncil.org/sites/default/files/research/SBInet_-_Looking_for_a_Quick_Fix_041510.pdf).
- Australia Group. "The Australia Group." Accessed March 6, 2024.  
<https://www.dfat.gov.au/publications/minisite/theaustraliagroupnet/site/en/index.html>.
- Bersin, Alan. (Former Commissioner of CBP and DHS Under Secretary for Policy, Covington & Burling LLP). Discussion with the authors. February 2024.
- Brock, Jan. "Understanding Cargo Preclearance." Pacific Customs Brokers. June 2, 2022.  
<https://www.pcbusa.com/post/what-is-cargo-preclearance>.
- Buoli, Alice, and Oana Cristina Tiganea, eds. *Territorial Fragilities in Cyprus: Planning and Preservation Strategies*. Cham, Switzerland: Springer, 2023.  
<http://ebookcentral.proquest.com/lib/aul/detail.action?docID=30754223>.
- Burkhard, Sarah, and Spencer Faragasso. (Researchers for the Peddling Peril Index (PPI)). Discussion with the authors. February 2024.
- Clark, Joseph. "Intelligence Official Underscores Importance of Partnerships." U.S. Department of Defense. November 1, 2023.  
<https://www.defense.gov/News/News-Stories/Article/Article/3576600/intelligence-official-underscores-importance-of-partnerships/>.
- Conklin, Ben. "OSINT: Revolution or Renaissance?" AFCEA International. September 1, 2023.  
<https://www.afcea.org/signal-media/intelligence/osint-revolution-or-renaissance>.
- Contrera, Russell. "The U.S. Is Using AI at U.S.-Mexico Border for Higher Surveillance." Axios. December 12, 2023.  
<https://www.axios.com/2023/12/12/border-patrol-ai-us-mexico-wall-surveillance-virtual>.
- Davis, John. "CBP Small Drones Program." U.S. Customs and Border Patrol. November 9, 2020.  
<https://www.cbp.gov/frontline/cbp-small-drones-program>.

- DeVine, Michael E. *United States Foreign Intelligence Relationships: Background, Policy and Legal Authorities, Risks, Benefits*. R45720. Washington, D.C.: Congressional Research Service, May 15, 2019. <https://www.everycrsreport.com/reports/R45720.html>.
- DeVine, Michael E. *United States Foreign Intelligence Relationships: Background, Policy and Legal Authorities, Risks, Benefits*. R45720. Washington, D.C.: Congressional Research Service, May 15, 2019. <https://www.everycrsreport.com/reports/R45720.html>.
- Dow Jones. “What Are Dual-Use Goods?” Accessed March 6, 2024. <https://www.dowjones.com/professional/risk/glossary/dual-use-goods-definition/>.
- Duggan, Ruth Ann. *Metrics for Border Management Systems*. Albuquerque, NM, and Livermore, CA: Sandia National Laboratories, July 2009. <https://www.osti.gov/biblio/985498>.
- Dungel, Emilia, and Francis Wairagu. “Taking Stock of Action on the Illicit Small Arms Trade: National Action Plans as a Strategic Tool for Weapons and Ammunition Management/Small Arms Control.” Medium. June 22, 2020. <https://smallarmssurvey.medium.com/taking-stock-of-action-on-the-illicit-small-arms-trade-national-action-plans-as-a-strategic-tool-cdbb288905e1>.
- European Commission. “Commission Implementing Regulation (EU) 2021/581.” EUR-Lex. April 12, 2021. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021R0581&qid=1618306409753>.
- European Commission. “Council Regulation (EC) No 2007/2004.” EUR-Lex. October 26, 2004. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32004R2007>.
- European Commission. “EUROSUR.” Migration and Home Affairs. Accessed April 7, 2024, [https://home-affairs.ec.europa.eu/policies/schengen-borders-and-visa/border-crossing/euro-sur\\_en](https://home-affairs.ec.europa.eu/policies/schengen-borders-and-visa/border-crossing/euro-sur_en).
- European Commission. “Frontex and the RABIT operation at the Greek-Turkish Border.” March 2, 2011. [https://ec.europa.eu/commission/presscorner/detail/pt/MEMO\\_11\\_130](https://ec.europa.eu/commission/presscorner/detail/pt/MEMO_11_130).
- European Commission. *Guidelines for Integrated Border Management in European Commission External Cooperation*. Brussels, Belgium: European Commission, November 2010. <https://www.icmpd.org/file/download/48280/file/Guidelines%20for%20Integrated%20Border%20Management%20in%20European%20Commission%20External%20Cooperation%20EN.pdf>.
- European Commission. *Practical Handbook for Border Guards*. Brussels, Belgium: European Commission, October 28, 2022. [https://home-affairs.ec.europa.eu/system/files/2022-11/Practical%20handbook%20for%20border%20guards\\_en.pdf](https://home-affairs.ec.europa.eu/system/files/2022-11/Practical%20handbook%20for%20border%20guards_en.pdf).
- European Commission. *Report from the Commission to the European Parliament and the Council on the Evaluation of the European Border Surveillance System (EUROSUR)*. Brussels,



Belgium: European Commission, September 12, 2018.

[https://home-affairs.ec.europa.eu/policies/schengen-borders-and-visa/border-crossing/eurosur\\_en#:~:text=Report%20on%20the%20evaluation%20of%20EUROSUR](https://home-affairs.ec.europa.eu/policies/schengen-borders-and-visa/border-crossing/eurosur_en#:~:text=Report%20on%20the%20evaluation%20of%20EUROSUR).

European Data Protection Supervisor. *Audit Report on the European Border and Coast Guard Agency (Frontex)*. Warsaw, Poland: European Data Protection Supervisor, May 24, 2023.

[https://www.edps.europa.eu/data-protection/our-work/publications/audits/2023-05-24-audit-report-frontex\\_en](https://www.edps.europa.eu/data-protection/our-work/publications/audits/2023-05-24-audit-report-frontex_en).

European Parliament, and the Council of the European Union. “Regulation (EU) 2016/1624 of the European Parliament and of the Council.” EUR-Lex. September 16, 2016.

<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016R1624>.

European Parliament Multimedia Centre. “Dual-Use Goods: What Are They and Why the New Rules?” March 22, 2021.

[https://multimedia.europarl.europa.eu/en/video/dual-use-goods-what-are-they-and-why-they-are-new-rules\\_N01-AFPS-210319-DUSE](https://multimedia.europarl.europa.eu/en/video/dual-use-goods-what-are-they-and-why-they-are-new-rules_N01-AFPS-210319-DUSE).

European Union. “Arms Trade Control.” Chemical, Biological, Radiological and Nuclear Risk Mitigation. Accessed March 6, 2024.

[https://cbrn-risk-mitigation.network.europa.eu/eu-p2p-export-control-programme/arms-trade-control\\_en](https://cbrn-risk-mitigation.network.europa.eu/eu-p2p-export-control-programme/arms-trade-control_en).

The European Union’s CARDS Regional Program. *Inter-agency Training Manual*. Accessed March 19, 2024.

[https://www.icmpd.org/file/download/48682/file/IBM\\_Regional\\_Inter-agency\\_Training\\_Manual\\_new\\_-\\_English.pdf](https://www.icmpd.org/file/download/48682/file/IBM_Regional_Inter-agency_Training_Manual_new_-_English.pdf).

Export Control and Related Border Security Program Officials (U.S. Department of State). Discussion with the authors. February 2024.

Frontex. “Standing Corps: Courses.” Accessed March 18, 2024.

<https://www.Frontex.europa.eu/about-Frontex/standing-corps/courses/#:~:text=Course%20on%20Integrated%20Border%20Management&text=Also%2C%20the%20training%20is%20tailored,course%20is%20delivered%20to%20them>

Frontex. “Management Board Decision 18/2022.” March 16, 2022.

[https://prd.Frontex.europa.eu/wp-content/uploads/mb-decision-18\\_2022-on-technical-equipment\\_deployed-in-fx-coordinated-activities-in-2023.pdf](https://prd.Frontex.europa.eu/wp-content/uploads/mb-decision-18_2022-on-technical-equipment_deployed-in-fx-coordinated-activities-in-2023.pdf)

Frontex. “Monitoring and Risk Analysis: CIRAM.” Accessed March 3, 2024.

<https://www.Frontex.europa.eu/what-we-do/monitoring-and-risk-analysis/ciram/>.

Frontex. “RABIT Operation 2010 Ends, Replaced By JO Poseidon 2011.” March 3, 2011.

<https://www.frontex.europa.eu/media-centre/news/news-release/rabit-operation-2010-ends-replaced-by-jo-poseidon-2011-iA6Kaq>.

- Frontex. "Risk Analysis: Strategic Risk Analysis." Accessed March 3, 2024. <https://www.Frontex.europa.eu/what-we-do/monitoring-and-risk-analysis/risk-analysis/strategic-risk-analysis/#:~:text=Frontex%20Risk%20Analysis%20Network%20>.
- Frontex European Border and Coast Guard Agency. *FRAN Quarterly: Quarter 2 April-June 2018*. Warsaw, Poland: Frontex, November 2018. [https://www.Frontex.europa.eu/assets/Publications/Risk\\_Analysis/FRAN/2018/FRAN\\_Q2\\_2018.pdf](https://www.Frontex.europa.eu/assets/Publications/Risk_Analysis/FRAN/2018/FRAN_Q2_2018.pdf)
- Gerstein, Daniel M., Anthony Adler, Aaron C. Davenport, Beth Grill, Amanda Kadlec, and William Young. *Managing International Borders: Balancing Security with the Licit Flow of People and Goods*. Santa Monica, CA: RAND, 2018. <https://www.rand.org/pubs/perspectives/PE290.html>.
- Global Counterterrorism Forum. "Good Practices in the Area of Border Security and Management in the Context of Counterterrorism and Stemming the Flow of 'Foreign Terrorist Fighters.'" September 22, 2011. <https://www.thegctf.org/Portals/1/Documents/Framework%20Documents/2016%20and%20before/GCTF-Good-Practices%20BSM-ENG.pdf?ver=2016-09-13-124953-540>.
- Global Organized Crime Index. "About the Index." 2023. <https://ocindex.net/about>.
- Global Organized Crime Index. "Criminality in Cyprus." Accessed April 12, 2024. <https://ocindex.net/country/cyprus>.
- Hales, Michael, and Michael Wagner. "Stronger Together: Expanding Partnerships for Global Security." National Geospatial-Intelligence Agency. October 1, 2017. [https://www.nga.mil/news/Stronger\\_together\\_Expanding\\_partnerships\\_for\\_globa.html](https://www.nga.mil/news/Stronger_together_Expanding_partnerships_for_globa.html).
- Hansen, Randall, and Demetrios Papademetriou. *Securing Borders: The Intended, Unintended, and Perverse Consequences*. Washington, D.C.: Migration Policy Institute, 2014. <https://www.migrationpolicy.org/sites/default/files/publications/BadActors-Hansen-PapademetriouFINALWEB.pdf>.
- Hoffman, Tyler. (Pacific Northwest National Laboratory). Discussion with the authors. March 2024.
- Holliday, Susan. "Frontline Preclearance." U.S. Customs and Border Protection. January 4, 2024. <https://www.cbp.gov/frontline/frontline-preclearance>.
- IEEE Public Safety Technology Initiative. "High-Tech Border Security: Current and Emerging Trends." Accessed April 4, 2024. <https://publicsafety.ieee.org/topics/high-tech-border-security-current-and-emerging-trend>.
- Institute for Science and International Security. "Institute for Science and International Security." Accessed April 7, 2024. <https://isis-online.org/>

- Interpol. “Radiological and Nuclear Prevention.” Accessed March 3, 2024, <https://www.interpol.int/en/Crimes/Terrorism/Radiological-and-Nuclear-terrorism/Radiological-and-nuclear-prevention>.
- Interpol, and the World Customs Organization. *Customs-Police Cooperation Handbook*. 2018. [https://cites.org/sites/default/files/eng/prog/enforcement/CustomsPoliceCoopHandbook\\_EN\\_LR.pdf](https://cites.org/sites/default/files/eng/prog/enforcement/CustomsPoliceCoopHandbook_EN_LR.pdf).
- Kaufmann, Daniel, and Aart Kraay. “Worldwide Governance Indicators.” World Bank. 2023. <https://www.worldbank.org/en/publication/worldwide-governance-indicators>.
- Koscak, Paul. “CBP National Targeting Center.” U.S. Customs and Border Protection. Accessed April 5, 2024. <https://www.cbp.gov/frontline/cbp-national-targeting-center>.
- Magalhaes, Igor C. “Border Security: An Assessment of the Metrics.” Texas Public Policy Foundation. October 15, 2019. <https://www.texaspolicy.com/border-security-an-assessment-of-the-metrics/>.
- Maletta, Giovanna, and Lauriane Héau. “Arms Transfer and SALW Control-Related Assistance in the Middle East and North Africa: Identifying Needs and Bridging Gaps.” Stockholm International Peace Research Institute. December 6, 2022. <https://www.sipri.org/commentary/topical-backgrounder/2022/arms-transfer-and-salw-control-related-assistance-middle-east-and-north-africa-identifying-needs-and>.
- Missile Technology Control Regime. “MTCR.” Accessed March 6, 2024. <https://www.mtcr.info/de>.
- Morrall, Andrew R., Henry H. Willis, and Peter Brownell. *Measuring Illegal Border Crossing Between Ports of Entry: An Assessment of Four Promising Methods*. Santa Monica, CA: RAND, 2011. [https://www.rand.org/pubs/occasional\\_papers/OP328.html](https://www.rand.org/pubs/occasional_papers/OP328.html).
- National Geospatial-Intelligence Agency. “MapCache.” Accessed April 7, 2024. [https://www.nga.mil/assets/files/Map\\_Cache\\_Slicksheet\\_NGA-U-2023-02550.pdf](https://www.nga.mil/assets/files/Map_Cache_Slicksheet_NGA-U-2023-02550.pdf).
- National Geospatial-Intelligence Agency. “Mobile Awareness GEOINT Environment (MAGE).” Accessed April 7, 2024. [https://www.nga.mil/assets/files/MAGE\\_Slicksheet\\_NGA-U-2023-02549.pdf](https://www.nga.mil/assets/files/MAGE_Slicksheet_NGA-U-2023-02549.pdf).
- National Geospatial-Intelligence Agency. “NGA at the 2023 DoDIIS Worldwide Conference.” Accessed April 4, 2024. [https://www.nga.mil/news/2023\\_DoDIIS\\_Worldwide\\_Conference.html](https://www.nga.mil/news/2023_DoDIIS_Worldwide_Conference.html).
- National Security Agency/Central Security Service. “National Cryptologic Museum Debuts Service & Sacrifice, Real Time Regional Gateway Exhibit.” July 12, 2017. <https://www.nsa.gov/Press-Room/News-Highlights/Article/Article/1670296/national-cryptologic-museum-debuts-service-sacrifice-real-time-regional-gateway/>.

- Nava, Victor. "Air Force General Reveals 'Alarming' Number of Drones Crossing into US Airspace at Southern Border." *New York Post*. March 15, 2024.  
<https://nypost.com/2024/03/15/us-news/air-force-general-reveals-alarming-number-of-drones-crossing-into-us-airspace-at-southern-border/>.
- Nuclear Suppliers Group. "Nuclear Suppliers Group." Accessed March 6, 2024.  
<https://www.nuclearsuppliersgroup.org/index.php/en/>.
- Office of the Director of National Intelligence. "Collaboration." Accessed March 19, 2024.  
<https://www.intelligence.gov/mission/our-values/344-collaboration>.
- Organization for the Prohibition of Chemical Weapons. "Chemical Weapons Convention." Accessed March 6, 2024. <https://www.opcw.org/chemical-weapons-convention>.
- Ortiz, Raul. (25th Chief of the United States Border Patrol). Discussion with the authors. February 2024.
- Punnen, Joseph. "Small Arms Trafficking In South And South East Asia: Analysis." *Eurasia Review*. September 3, 2020.  
<https://www.eurasiareview.com/03092020-small-arms-trafficking-in-south-and-south-east-asia-analysis/>.
- Ramirez, Edgar. (Former DHS and CBP and expert on the US-Mexico Border). Discussion with the authors. February 2024.
- Sarhan, Mohanad, Siamak Layeghy, Nour Moustafa, and Marius Portmann. "Cyber Threat Intelligence Sharing Scheme Based on Federated Learning for Network Intrusion Detection." *Journal of Network and Systems Management* 31, no. 3 (2023): 1-23.  
<https://doi.org/10.1007/s10922-022-09691-3>.
- Serbin Pont, Andrei. "Uncovering Illegal Weapons Trafficking Trends in Latin America Through Open-Source Research." *Bellingcat*. February 8, 2024.  
[https://www.bellingcat.com/resources/2024/02/08/uncovering-illegal-weapons-trafficking-trends-in-latin-america-through-open-source-research/?utm\\_source=substack&utm\\_medium=email](https://www.bellingcat.com/resources/2024/02/08/uncovering-illegal-weapons-trafficking-trends-in-latin-america-through-open-source-research/?utm_source=substack&utm_medium=email).
- Smiths Detection. "Risk Based Screening for a More Secure Aviation Network." April 25, 2023.  
<https://www.smithsdetection.com/insights/risk-based-screening-for-a-more-secure-aviation-network/>.
- Society of Satellite Professionals International. "How Satellites Secure the Border." *Via Satellite*. Accessed April 4, 2024.  
<https://interactive.satellitetoday.com/how-satellites-secure-the-border/>.
- Statewatch. "EU: Frontex: Equipment Requirements for 2023 Include 'Lethal and Non-Lethal Weapons.'" April 21, 2022.  
<https://www.statewatch.org/news/2022/april/eu-Frontex-equipment-requirements-for-2023-include-lethal-and-non-lethal-weapons/>.

TED eTendering. “Provision of Special Garments (Frontex).” October 10, 2023.  
<https://etendering.ted.europa.eu/cft/cft-display.html?cftId=15473>.

Trautman, Laurie. (Director of the Border Policy Research Institute at Western Washington University). Discussion with the authors. February 21, 2024.

United Nations. International Instrument to Enable States to Identify and Trace, in a Timely and Reliable Manner, Illicit Small Arms and Light Weapons. Accessed April 12, 2024.  
<https://front.un-arm.org/wp-content/uploads/2021/03/International-Tracing-Instrument-six-official-languages.pdf>.

United Nations Office for Disarmament Affairs. “Biological Weapons Convention.” Accessed March 6, 2024. <https://disarmament.unoda.org/biological-weapons/>.

United Nations Office for Disarmament Affairs. “Modular Small-Arms-Control Implementation Compendium (MOSAIC).” Accessed March 3, 2024.  
<https://disarmament.unoda.org/convarms/mosaic/>.

United Nations Office for Disarmament Affairs. “Treaty on the Non-Proliferation of Nuclear Weapons (NPT).” Accessed March 6, 2024.  
<https://disarmament.unoda.org/wmd/nuclear/npt/>.

United Nations Office for Disarmament Affairs. “UN Security Council Resolution 1540 (2004).” Accessed April 7, 2024. <https://disarmament.unoda.org/wmd/sc1540/>.

United Nations Office for Disarmament Affairs: Regional Centre for Peace and Disarmament in Asia and the Pacific. “Programme of Action.” September 27, 2013.  
<https://www.unrcpd.org/conventional-weapons/poa/>.

United Nations Office on Drugs and Crime. “Responses: Border Liaison Office (BLO) Network.” Accessed April 7, 2024. [http://asia.aidforum.org/docs/Gerson\\_Bergeth.pdf](http://asia.aidforum.org/docs/Gerson_Bergeth.pdf).

United Nations Office on Drugs and Crime. “The Firearms Protocol.” Accessed March 6, 2024.  
<https://www.unodc.org/unodc/en/firearms-protocol/the-firearms-protocol.html>.

United Nations Office on Drugs and Crime. “UNODC Supports New Cyprus Training Centre for Tackling Maritime Crime in the Eastern Mediterranean.” July 14, 2022.  
<https://www.unodc.org/unodc/en/frontpage/2022/July/unodc-supports-new-cyprus-training-centre-for-tackling-maritime-crime-in-the-eastern-mediterranean.html>.

United Nations 1540 Committee. “General Information.” Accessed April 7, 2024.  
<https://www.un.org/en/sc/1540/national-implementation/1540-matrices.shtml>.

United Nations 1540 Committee. “1540 Matrices.” Accessed April 7, 2024.  
<https://www.un.org/en/sc/1540/national-implementation/1540-matrices.shtml>.

U.S. Customs and Border Protection. *PMOD Capability Roadmap: Enabling a More Autonomous USBP*. No. 3299-0823. May 2023.

<https://www.cbp.gov/sites/default/files/assets/documents/2023-Oct/PMOD%20Capability%20Roadmap%20Final%20%28508%29.pdf>.

U.S. Department of Homeland Security. *SBI Net Program: Program-Specific Recovery Act Plan*. May 15, 2009.  
[https://www.dhs.gov/xlibrary/assets/recovery/CBP\\_SBI Net\\_Program\\_Final\\_2009-05-15.pdf](https://www.dhs.gov/xlibrary/assets/recovery/CBP_SBI Net_Program_Final_2009-05-15.pdf).

U.S. Department of Homeland Security. “Statement from Secretary Mayorkas on the President’s Fiscal Year 2025 Budget for the U.S. Department of Homeland Security.” March 11, 2024.  
<https://www.dhs.gov/news/2024/03/11/statement-secretary-mayorkas-presidents-fiscal-year-2025-budget-us-department>.

U.S. Department of Homeland Security Office of Inspector General. *Special Report: Lessons Learned from Prior Reports on CBP’s SBI and Acquisitions Related to Securing our Border*. OIG-17-70-SR. June 12, 2017.  
<https://www.oig.dhs.gov/sites/default/files/assets/2017/OIG-17-70-SR-Jun17.pdf>.

U.S. Government Accountability Office. *Homeland Security: Information on Training New Border Patrol Agents*. GAO-07-540R. Washington, D.C.: March 30, 2007.  
<https://www.gao.gov/products/gao-07-540r>.

Van Son, Paul. (Former Senior Advisor at the U.S. Department of State). Discussion with authors. March 2024.

Varisco, Andrea Edoardo. *The International Tracing Instrument: Examining Options to Support Operationalization*. Geneva, Switzerland: United Nations Institute for Disarmament Research (UNIDIR), January 1, 2018.  
[https://www.academia.edu/38151691/The\\_International\\_Tracing\\_Instrument\\_Examining\\_Options\\_to\\_Support\\_Operationalization](https://www.academia.edu/38151691/The_International_Tracing_Instrument_Examining_Options_to_Support_Operationalization).

Wassenaar Arrangement. “The Wassenaar Arrangement.” Accessed April 7, 2024.  
<https://www.wassenaar.org/>.

Wayne, Earl Anthony. (Ambassador of the United States of America). Discussion with the authors. April 2024.

Willis, Henry H., Joel B. Predd, Paul K. Davis, and Wayne Brown. *Measuring the Effectiveness of Border Security Between Ports-of-Entry*. Santa Monica, CA: RAND, 2010.  
[https://www.rand.org/pubs/technical\\_reports/TR837.html](https://www.rand.org/pubs/technical_reports/TR837.html).

Wolczuk, Kataryna, and Rilka Dragneva. “Russia’s Longstanding Problem with Ukraine’s Borders.” Chatham House. September 24, 2022.  
<https://www.chathamhouse.org/2022/08/russias-longstanding-problem-ukraines-borders>.

World Customs Organization. “Membership.” February 27, 2024.  
<https://www.wcoomd.org/-/media/wco/public/global/pdf/about-us/wco-members/list-of-members-with-membership-date.pdf?db=web>.

World Customs Organization. *Strategic Trade Control Enforcement (STCE): Implementation Guide*. 2023.

<https://www.wcoomd.org/en/topics/enforcement-and-compliance/instruments-and-tools/guidelines/wco-strategic-trade-control-enforcement-implementation-guide.aspx>.

World Customs Organization. “The Anti-Corruption and Integrity (A-CIP) Programme.” Accessed March 3, 2024.

<https://www.wcoomd.org/en/topics/capacity-building/activities-and-programmes/cooperation-programmes/acip-programme.aspx>.

World Customs Organization. *The Revised Arusha Declaration: Declaration of the Customs Co-operation Council concerning Good Governance and Integrity in Customs*. 2003.

<https://rad.wcoomd.org/>.