Written Statement

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U.S. Department of Homeland Security

FOR A HEARING ON

"Role of Technology in Aviation Security"

BEFORE THE

UNITED STATES HOUSE OF REPRESENTATIVES

COMMITTEE ON HOMELAND SECURITY

SUBCOMMITTEE ON TRANSPORTATION AND MARITIME SECURITY

October 19, 2023

Introduction

Good morning, Chairman Gimenez, Ranking Member Thanedar, and distinguished Members of the Subcommittee. Thank you for inviting me and my Transportation Security Administration (TSA) colleague, Mr. Mario Wilson, to testify on the role of technology in aviation security. Our testimony will highlight the development of requirements for new checkpoint technologies, acquisition timelines with the associated funding requirements, and how the technology is used in the field to both enhance security effectiveness and improve the passenger experience.

First and foremost, I would like to thank the Committee and Congress for your continued support of our workforce, most notably through approving funding for TSA's pay plan which was included in the FY 2023 Omnibus Appropriations Act. Although today's hearing is focused on technology, it is important to note that sustaining this increase in pay for our entire workforce ensures that those who we need to operate TSA's government funded technology are properly and comparably paid. This is especially important as we have seen record-breaking passenger volume in recent months. This necessary and significant increase in pay that occurred in July upon conversion to the new pay plan brought the salaries of TSA personnel to a level equal to our federal counterparts, and will enable the TSA to recruit, and most importantly retain, top candidates for federal employment. Positive impacts are already being seen. The TSA is committed to providing the very best tools, training, and procedures to our personnel to enable them to efficiently and effectively secure the aviation system.

Second, TSA has seen the benefits of dedicated annual funding for our checked bag systems and are supportive of any legislation that would establish a similar concept for our checkpoint security screening technology. Dedicated funding would enable TSA to complete the deployment of new technologies years, if not decades, ahead of its current deployment timelines of 2042 and 2049. Ending the diversion of the Security Service Fee is critical to TSA's mission. In the aftermath of the terrorist attacks of 9/11, Congress authorized the collection of a fee from commercial flight passengers to offset the costs for civil aviation security services: the Security Service Fee. In 2014, Congress passed legislation to increase the fee to $5.60 per one-way trip with a maximum of $11.20 per round trip. However, the legislation also diverted a large portion of the fees collected away from TSA and to the Treasury General Fund – not for aviation

security. If the diversion of the fee away from TSA is terminated and the fees collected are directed back towards TSA as originally intended, it will provide TSA approximately $1.6 billion annually to offset the agency's appropriated funding. This funding is essential as TSA has seen an unprecedented increase in passenger volume in recent months, which is projected to increase even further in the future.

Passenger volumes have recovered and are exceeding pre-pandemic levels. TSA is screening an average of 2.3 million passengers per day. In FY 2023, TSA screened a total of 838.1 million passengers, a 13.8 percent increase from the prior year; 99.1 percent of passengers waited 30 minutes or less in standard lanes and 98.7 percent of passengers waited 10 minutes or less in TSA PreCheck lanes. This summer, TSA screened 150 million checked bags. In FY 2023, TSA experienced six of the busiest travel days on record, the highest being June 30, 2023 with 2.88 million passengers screened.

Checkpoint Security Screening Technology

Given this staggering volume, it is imperative that TSA develop and deploy the most effective technologies available to promote safe air travel of passengers, checked baggage, and cargo, while ensuring that the system supports a positive and streamlined customer service experience. To do this, TSA uses robust risk analytics to inform the operational requirements for screening equipment, ensuring that investments are made in technologies that provide the most security benefit. These risk analytics are then used to inform research priorities for the agency to ensure research and development (R&D) funding is applied to the most pressing needs.

Recent research efforts include biometric identification technologies, advanced algorithms for explosives and prohibited items (guns, knives, grenades, etc.), detection in carry-on baggage, and advanced on-person screening equipment. Additional critical research is being conducted into what is called Alarm Resolution. Alarm Resolution is the process Transportation Security Officers (TSOs) use to resolve alarms that occur during on-person or luggage screening to quickly determine if the alarm is the result of an actual prohibited item.

TSA coordinates all of these R&D activities with the Department of Homeland Security (DHS) Science and Technology (S&T) Directorate, ensuring no redundancies. TSA also actively

participates in S&T's research portfolio development process to ensure that the Administration's basic research needs are addressed.

What follows is a summary of TSA's major procurement efforts and plans for future technology development and fielding.

Credential Authentication Technology

Credential Authentication Technology (CAT) is one example of the agency's major procurement efforts. From a security perspective, positive identification of passengers is critical to aviation security. In FY 2023, TSA discovered a total of 452 fraudulent IDs at a checkpoint. The CAT is a technology that scans a passenger's identity credential (driver's license, passport, etc.) for security features, displays it on a screen for the TSO to compare it to the passenger's face, and connects to TSA's Secure Flight passenger prescreening system, returning the passenger's screening status (i.e., Standard, TSA PreCheck, or Selectee) in near real time. This enables the officer to more accurately identify the passenger and direct them to the appropriate level of screening, and it negates the need to produce a boarding pass. Currently, a total of 2,054 CAT machines are deployed at 227 locations.

Building on the success of the CAT, TSA is integrating digital identity capabilities, namely the interoperability of state-issued mobile Driver's Licenses, into the second generation CAT system known as the CAT-2. The CAT-2 incorporates biometric matching and digital identity functionality into the CAT unit. The biometric capability on the CAT-2 is a 1:1 facial match where the system compares a live photo of the individual's face with the image on the physical credential. The passenger allows permission for their smart device to transmit their credential information to TSA using the CAT-2 unit, where the CAT-2 performs biometric matching against the digitally provided credential. In September 2023, TSA began retrofitting the existing CAT units with upgrade kits providing CAT-2 functionality, including the ability to interact with digital identities. The TSA will continue to deploy these upgrade kits to existing CAT units throughout FY 2024.

Given the wide diversity of the millions of passengers moving through airport checkpoints daily, accuracy in biometric solutions is a key issue for TSA. Therefore, TSA is grounding its exploration of biometric solutions in rigorous scientific study and analysis to

ensure the full benefits of biometrics technology are realized. We are aware of a variety of public concerns related to performance errors and take this issue seriously. Along with its federal partners, TSA is carefully studying matching performance differences across biometric systems and operational environments to identify the existence of disparities on these and other grounds. TSA works closely with Department of Homeland Security's Science and Technology Directorate and National Institute of Standards and Technology to independently assess the performance of biometrics solutions and found no statistically significant differences in biometric performance across gender, race, and skin tone under varied test conditions for the CAT-2 system. Accuracy in biometric solutions is a priority for TSA, and one that is being carefully studied to ensure TSA realizes the full benefits of this technology and makes informed decisions to mitigate risks.

TSA is also conducting a "1:n" facial identification touchless proof of concept for passengers with a Known Traveler Number (KTN) who are eligible to participate in TSA PreCheck. 1:n is a process that uses the Customs and Border Protection's Traveler Verification Service (TVS); galleries of day-of travelers are built of passengers who have met the requirements and have opted-in to the touchless experience. TSA PreCheck passengers in these locations can step up to the system, have their face photographed, and have their image matched against the day-of gallery in TVS. If there is an identity match, they are allowed to enter the security checkpoint without having to produce any physical or digital forms of ID. Through this innovation, TSA PreCheck passengers now can process through the security checkpoint significantly faster than through the standard CAT-2 protocol. Passengers must take several steps to participate and already have a photo on file for the purpose of travel. Privacy is protected through opt-in consent and deletion of the photo collected at the checkpoint within 24 hours after flight.

If a passenger decides not to opt-in to using biometrics identification, then a normal manual verification process is used. This is addressed in the Privacy Impact Assessment for this touchless proof of concept, and signage is prominently displayed near the 1:n prototype devices.

All of TSA's identity management, facial recognition, and biometric programs are reviewed internally by TSA Privacy and TSA Civil Rights & and Liberties offices, as well as by

the DHS Privacy and DHS Civil Rights and Civil Liberties offices to ensure the protection of privacy, civil rights, and civil liberties of the traveling public.

Lastly, the careful development and deployment of biometric and digital identification capabilities will significantly streamline the passenger identification process while ensuring privacy is enhanced.

Checkpoint Property Screening System and Computed Tomography

Another major technology advancement that TSA is currently procuring is the Checkpoint Property Screening System, or CPSS. At the current rate, TSA will surpass last year's record of 6,542 firearms prevented from getting onboard an aircraft. The CPSS consists of a computed tomography (CT) three-dimensional X-ray scanner. A three-dimensional CT image enables the TSO to rotate the image, scan through items in order to better identify potential threat contents, and virtually remove laptops in the image to assess for signs of tampering. The system is capable of using advanced detection algorithms to detect explosive materials. TSA, in conjunction with the CPSS manufacturers, are currently developing Prohibited Item algorithms to detect weapons such as knives and firearms. There are currently 781 CPSSs installed in the field, and TSA currently has contracts in place with three vendors to deliver additional CT capability. These new CPSSs come in one of three configurations: base, mid-size, and full-size, depending on the size of, and space at, the airport checkpoint.

CAT and CPSS Deployment Timelines

Due to funding constraints, TSA does not have the resources needed to purchase and deploy all of the necessary equipment to airports nationwide. Based on the current funding levels, TSA will not be able to deploy all of the 3,585 CAT machines needed to airports until approximately 2049. Similarly, it will take until approximately 2042 for TSA to be able to deploy all of the 2,263 CPSS machines to airports.

On-Person Screening Technology

TSA is currently in the development phase of the next generation of on-person screening technology. On-person screening technology currently consists of the Walk-Through Metal Detector (WTMD) and the Advanced Imaging Technology (AIT). The WTMD is currently used

predominantly for TSA PreCheck passengers to screen for metallic objects. The AIT is used to screen standard, non-PreCheck passengers for metallic and non-metallic objects. The WTMD is unable to detect non-metallic items, to include explosives, but it provides for expanded passenger throughput for the vetted TSA Trusted Traveler and TSA PreCheck populations. The AIT screens standard, non-PreCheck passengers without physical contact for both metallic and non-metallic threats, including weapons and explosives that may be concealed under a passenger's clothing. Utilization of AIT decreases the need for pat downs for both metallic and non-metallic threats, including weapons and explosives.

In June 2023, TSA concluded deployment of the low probability of false alarm algorithm on AIT units to increase detection capability, decrease false alarm rates, and reduce the need for a pat down by 50 percent. Additionally, High-Definition AIT is currently being tested in the DHS S&T Transportation Security Laboratory in Atlantic City, NJ. If successful, this new technology will both significantly increase security through enhanced threat detection and decrease the false alarm rate even further, which would also help accelerate passenger throughput.

TSA is also evaluating screening technologies to replace the WTMD. These technologies show promise in detection of both metallic and non-metallic items when passengers pause, or walk through, the equipment at a slow speed.

Advanced Alarm Resolution Capabilities

The TSA is also currently conducting extensive research into advanced Alarm Resolution (AR) capabilities. The AR program will replace older and limited resolution systems (e.g., the current Bottle Liquid Scanners) with next generation solutions such as Bulk Resolution Technology that will positively identify a significantly increased number of threat materials concealed in containers.

Checked Baggage Capabilities

The TSA is also investigating the next generation of checked baggage (CB) screening systems. TSA has developed a CB roadmap outlining the needed capability enhancements and technology upgrades over the next several years. The roadmap defines the TSA's current state and future vision for CB capability and is designed to guide investments into the long-term

research, innovation development, and acquisition strategy. The TSA must seek technology aimed at closing the capability gaps in today's CB screening systems. Through dedicated research and innovation, the agency will introduce new technologies with the ability to detect an expanded set of threat materials, lower false-alarm rates, and lower lifecycle costs. Ideally, all future capabilities will reduce the cognitive burden on the TSOs and improve their operator experience and detection ability, which will ultimately improve the passenger experience. Historically, some airports lacked the infrastructure to accommodate the large and heavy Explosive Detection System (EDS) machines. Those airports were required to rely solely on the use of Explosive Trace Detection (ETD) to screen passengers and their luggage. To improve CB security effectiveness, the TSA is transitioning from ETD-only to EDS at locations that are now capable of supporting EDS. Additionally, TSA recently tested Dual Use Computed Tomography (DUCT) in some airports, which utilizes one piece of screening equipment to screen both carry-on and checked baggage. Early results show that the use of DUCT systems would significantly increase security effectiveness. DUCT systems could be deployed at low volume airports that currently rely on ETD physical search.

Cargo Capabilities

TSA is also responsible for the oversight of the screening of cargo. TSA established the Certified Cargo Screening Program in 2009 under which it certifies cargo screening facilities in the United States in order to meet the mandates of the 9/11 Act to screen 100 percent of cargo transported on passenger aircraft. The TSA requires Certified Cargo Screening Facilities (CCSF) or their authorized representatives to use TSA-approved methods which include diverse methods of screening such as X-ray systems, EDS, ETD, explosives detection canine teams certified by TSA, or a physical search together with manifest verification. The range of air cargo commodity types is extraordinarily wide, and this poses challenges to developing appropriate screening systems. TSA is aggressively pursuing next generation solutions including systems that combine X-ray, ETD, or EDS enabling technologies to not only rely on images but leverage the ability to detect trace components; large aperture systems that enable screening an entire pallet at one time; fast parcel systems to increase throughput; and automated alarm software that is currently being developed in partnership with DHS S&T to mitigate complete reliance on screeners.

Open Architecture

The technologies discussed above, and any future acquisitions, will be grounded in Open Architecture (OA). OA is a design approach where components such as software and hardware are standards-based and interoperable to allow any vendor to create improved subcomponents such as new detection algorithms, enhancements to user interfaces, and reporting systems to support improved business intelligence. Ultimately, these components come together to create a superior combined system.

Leveraging OA will improve TSA's ability to rapidly respond to emerging threats and work with all of industry to address capability needs. OA strengthens TSA's ability to stay ahead of ever-evolving threats through greater agility and flexibility in the acquisition of innovative, interconnected and advanced transportation security technologies. It will define an improved approach to delivering enhanced capabilities to the field in a timely manner, providing the workforce access to the most effective security technology while simplifying the processes and procedures used to help keep the nation secure. TSA published the Open Architecture Roadmap in July 2023 and is actively working to operationalize key OA concepts in FY 2024.

Passenger Experience

As TSA develops and deploys new checkpoint security screening technology and procedures, the agency's primary focus is on strengthening aviation security while enhancing the passenger experience. CAT enables TSOs to validate a traveler's reservation without having to request a boarding pass thus reducing documentation requirements for the traveling public to access our security checkpoints. The deployment of CT three-dimensional X-ray machines will reduce the need for passengers to remove items from their bags, greatly improving throughput at the checkpoint. The development of advanced detection algorithms will enable TSOs to focus on potential threats that are automatically identified, both improving security and increasing efficiencies. New on-person screening capabilities will further reduce the need for pat-downs, significantly improving the passenger experience.

Any investments in technology to improve security enhancements must be placed in the hands of a talented and well-trained workforce. The TSA is committed to providing the very best

tools, training, and procedures to our personnel to enable them to efficiently and effectively secure the aviation system.

Conclusion

To carry out its aviation security mission, TSA needs dedicated, predictable, and robust funding to continue to develop and deploy next-generation checkpoint security screening technology and procedures. TSA is actively pursuing these technologies in partnership with multiple vendors, including small businesses. The single biggest limiting factor is that TSA is inadequately funded to fully implement checkpoint technology acceleration plans to address known and evolving threats. As passenger throughput continues to increase, TSA must have the tools and technology necessary to ensure the safety and freedom of movement of people and commerce.

Chairman Gimenez, Ranking Member Thanedar, and members of the Subcommittee, thank you for the opportunity to appear before you today on the role technology plays in aviation security. My colleague and I look forward to your questions.

United States Government Accountability Office

Testimony
Before the Subcommittee on Transportation and Maritime Security, Committee on Homeland Security, House of Representatives

For Release on Delivery
Expected at 10 a.m. ET
Thursday, October 19, 2023

AVIATION SECURITY

TSA Could Better Ensure Detection and Assess the Potential for Discrimination in Its Screening Technologies

Statement of Tina Won Sherman, Director,
Homeland Security and Justice

GAO-24-107094

GAO Highlights

Highlights of GAO-24-107094, a testimony before the Subcommittee on Transportation and Maritime Security, Committee on Homeland Security, House of Representatives

Why GAO Did This Study

TSA employs passenger and baggage screening technologies to mitigate the threat of terrorism. TSA has faced challenges ensuring these technologies consistently meet detection requirements. The agency has also faced allegations that some of its screening practices, such as the use of advanced imaging technology, may refer certain passengers more frequently to additional screening.

This statement discusses TSA's efforts to (1) ensure passenger and baggage screening technologies continue to meet detection requirements after deployment and (2) assess the extent to which its use of advanced imaging technology refers certain passengers to additional screening more often than others.

This statement is based primarily on reports GAO issued in December 2019 and November 2022 on detection requirements for TSA screening technologies (GAO-20-56) and TSA's efforts to ensure its passenger screening practices do not result in discrimination (GAO-23-105201). To report on actions taken to address recommendations, GAO assessed implementation reports and reviewed agency documents and responses.

What GAO Recommends

GAO made a total of nine recommendations in the December 2019 and November 2022 reports. DHS concurred with all nine recommendations. Seven remain open. However, TSA has taken steps to implement them, including the four recommendations to address the issues discussed in detail in this statement.

View GAO-24-107094. For more information, contact Tina Won Sherman at (202) 512-8461 or shermant@gao.gov.

October 19, 2023

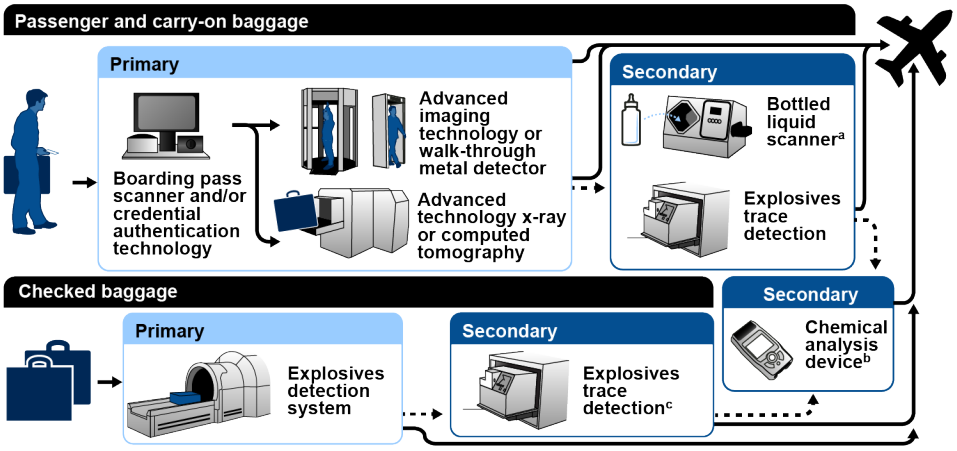
AVIATION SECURITY

TSA Could Better Ensure Detection and Assess the Potential for Discrimination in Its Screening Technologies

What GAO Found

In December 2019, GAO reported that the performance of technologies the Transportation Security Administration (TSA) uses to screen passengers and baggage at airports can degrade over time. However, TSA does not ensure that such technologies continue to meet detection requirements after deployment to airports.

Transportation Security Administration (TSA) Technologies Used for Checkpoint and Checked Baggage Screening



Source: GAO analysis of TSA information, GAO icons. | GAO-24-107094

TSA certifies technologies to ensure they meet requirements before deployment, and its officers are to regularly calibrate deployed technologies to demonstrate they are minimally operational. However, neither of these actions ensures that technologies continue to meet requirements after deployment. In 2015 and 2016, the Department of Homeland Security (DHS) tested a sample of deployed explosives trace detection and bottled liquid scanner units and found that some no longer met detection requirements. GAO recommended that TSA develop and implement a process to ensure technologies continue to meet detection requirements after deployment. TSA began requiring reviews of technologies after deployment in 2020 and is working to update its policy. TSA has also begun to conduct reviews and report on the results.

In November 2022, GAO reported that TSA officials at four selected airports and representatives from seven selected stakeholder organizations, such as the National Center for Transgender Equality and the Sikh Coalition, stated that the use of advanced imaging technology can result in certain passengers being referred for additional screening more frequently than others. These include transgender passengers and those who wear religious headwear or have disabilities. GAO recommended that TSA (1) collect data on referrals for additional screening, and (2) assess the extent to which its screening practices comply with agency non-discrimination policies. According to TSA officials, the agency has taken steps to collect data on such referrals, including the cause of additional screening, and plans to assess the data to inform the development and use of advance imaging technology.

Chairman Gimenez, Ranking Member Thanedar, and Members of the Subcommittee:

Thank you for the opportunity to contribute to today's discussion on aviation screening technologies. The Transportation Security Administration (TSA) is charged with the mission of protecting the nation's transportation systems, including preventing acts of terrorism on these systems and responding to ever-evolving threats. To mitigate these threats, TSA employs technologies to screen passengers and their carry-on and checked baggage for explosive materials and other prohibited items. The ongoing threat of terrorism and the projected growth in air travel highlight the importance of TSA continually assessing the effectiveness of its screening operations. However, the agency has faced challenges ensuring these technologies consistently meet detection requirements.[1]

TSA's *2020 Biennial National Strategy for Transportation Security* states that while striving to enhance transportation security, the government must preserve and protect the fundamental civil rights and civil liberties of the public it serves.[2] As such, it is important for TSA to carry out its security mission while ensuring its screening practices do not result in discrimination against passengers.[3] Yet the agency has received allegations that some of its screening practices, such as the use of advanced imaging technology, may refer certain passengers more frequently to additional screening.[4]

[1]International Air Transport Association, *Global Outlook for Air Transport: Highly Resilient, Less Robust* (Montreal, Quebec, Canada.: June 2023).

[2]TSA, *2020 Biennial National Strategy for Transportation Security*, Report to Congress (May 29, 2020).

[3]TSA guidance states that prohibited discrimination occurs when TSA provides members of the public lesser, segregated, or different treatment (e.g., profiling, harassment, denial of services) based on protected class characteristics (e.g., hair style, clothing, skin color, manner of speaking, country of origin, name, religious articles or jewelry). See Transportation Security Administration, *Unlawful Profiling: What It Is and How To Avoid It* (Nov. 13, 2017).

[4]Advanced imaging technology machines use automated recognition software to screen passengers without physical contact and locate potential metallic and non-metallic threats, such as weapons or explosives, which may be concealed under clothing. Passengers who trigger an alarm on the machines may be required to undergo additional screening, which could include a targeted pat-down and, in some cases, explosive trace detection screening.

My remarks today will focus on TSA's efforts to (1) ensure that passenger and baggage screening technologies meet the requirements for detection standards after deployment and (2) assess the extent to which its use of advanced imaging technology refers certain passengers to additional screening more often than others. This statement is primarily based on two reports—our December 2019 report about TSA's efforts to ensure passenger and baggage screening technologies continue to meet detection requirements after deployment and our November 2022 report about TSA's efforts to help ensure its airline passenger screening practices do not result in discrimination against passengers.[5] This statement also includes selected updates on actions TSA has taken to implement the recommendations from these two reports. In doing so, we assessed technology implementation reports and reviewed agency documents and responses.[6]

Our work examining TSA's passenger and baggage screening included analyzing documents on TSA's screening procedures, technology, and detection requirements, and interviewing TSA officials. For our work on screening technologies, we assessed operational requirements for technologies that were subject to TSA detection standards and calibration procedures. We compared TSA processes for ensuring deployed technologies meet requirements against DHS acquisition regulations and policies. Additionally, we observed screening operations and technologies at seven airports, which we selected based on airport category and geographic location.

For our work on TSA efforts to prevent discrimination, we visited four airports, selected based on size, complaints filed, and other factors. At these airports, we observed screening operations, interviewed TSA officials, and conducted 12 discussion groups with Transportation Security Officers who perform checkpoint screening. We also interviewed seven stakeholder organizations, including those representing religious groups and persons with disabilities, selected based on their work on airline security screening. Detailed information about the scope and

[5]GAO, *Aviation Security: TSA Should Ensure Screening Technologies Continue to Meet Detection Requirements after Deployment*, GAO-20-56 (Washington, D.C.: Dec. 5, 2019); and GAO, *Aviation Security: TSA Should Assess Potential for Discrimination and Better Inform Passengers of the Complaint Process*, GAO-23-105201 (Washington, D.C.: Nov. 7, 2022).

[6]For the recommendations in our 2022 report, TSA provided its last response to our follow-up questions on the actions taken to implement them in July 2023.

methodology for our prior work can be found in the products cited throughout this statement.

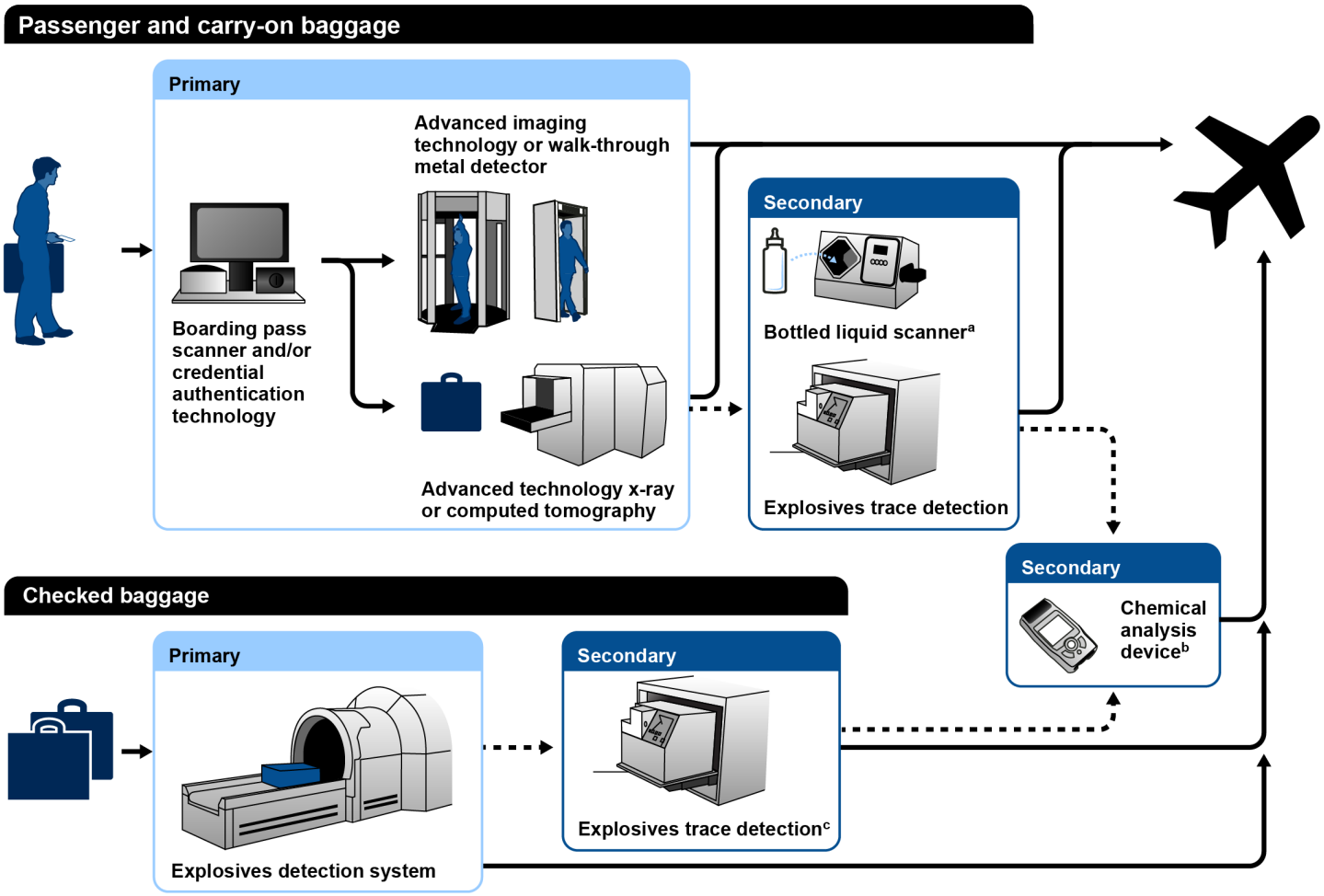
We conducted the work on which this statement is based in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Terrorist organizations have a long history of targeting passenger aircraft using conventional and homemade explosives and other prohibited items, such as guns and knives. To mitigate this threat, TSA procedures generally provide that all passengers pass through security checkpoints where their person, identification documents, and carry-on bags are screened to detect and deter the smuggling of prohibited items into restricted airport areas and onto aircraft.[7] TSA uses a variety of screening technologies—a combination of hardware and software designed to detect threats—to protect the nation's civil aviation system. Figure 1 depicts the various screening technologies TSA may use in primary and secondary passenger and checked baggage screening.

[7]Passengers' checked baggage are screened separately.

Figure 1: Transportation Security Administration (TSA) Technologies Used for Checkpoint and Checked Baggage Screening



Source: GAO analysis of TSA information, GAO icons. | GAO-24-107094

[a]Advanced imaging technology uses automated recognition software to screen passengers without physical contact and locate potential metallic and non-metallic threats, such as weapons or explosives, which may be concealed under clothing.

[b]Bottled liquid scanners are located at secondary screening, but according to TSA officials may be used for either primary or secondary screening of liquids.

[c]TSA explosives specialists use the chemical analysis device to resolve alarms for passenger, carry-on, and checked baggage screening.

[d]At certain TSA-regulated (commercial) airports, explosives trace detection is the primary technology used for screening checked baggage.

For each screening technology, TSA develops detection standards that identify and describe the prohibited items that the technology is required

to detect during the screening process.[8] These standards, which are classified, also identify how often the technology should detect prohibited items and the maximum allowable rate at which the technology incorrectly identifies prohibited items. For explosive materials, the standards also identify what the screening technology is required to detect in terms of (1) the minimum amount or weight of the material and (2) the chemical and physical makeup of the material.

TSA Should Ensure Screening Technologies Continue to Meet Detection Requirements after Deployment

TSA's Practices Do Not Ensure Screening Technologies Continue to Meet Detection Requirements after Deployment

In December 2019, we reported that TSA's practices do not ensure that screening technologies continue to meet detection requirements after those technologies have been deployed to airports.[9] According to TSA officials, the agency uses two processes—certification and calibration—to ensure screening technologies are operating as intended. The certification process is designed to ensure that new technologies meet detection requirements before they are procured and deployed to airports.[10] TSA officials also stated that daily calibration helps ensure that the technologies are at least minimally operational while in use at

[8]As of December 2019, the screening technologies for which explosives detection standards were developed were advanced imaging technology, advanced technology x-ray, bottled liquid scanner, computed tomography, explosives detection system, and explosives trace detection. According to DHS officials, the agency also screens for "explosives precursors," which are chemical substances that, when combined with another substance, could be used to create a homemade explosive on board an aircraft. Explosives precursors can be used for legitimate purposes.

[9]GAO-20-56.

[10]During the certification process, DHS's Science and Technology Directorate tests the technology under controlled conditions at its Transportation Security Laboratory to determine whether it meets TSA's detection requirements. After TSA certifies that a technology meets detection requirements (and it undergoes additional testing for other requirements), TSA may deploy the technology to selected airports for operational testing and evaluation to determine how it performs in an airport setting.

airports.[11] However, while certification and calibration serve important purposes in the acquisition and operation of screening technologies, these processes do not ensure that TSA screening technologies continue to meet detection requirements after they have been deployed.

The certification process, for instance, does not account for the possibility that technology performance can degrade over time, throughout the technology's lifecycle. For example, in 2015 and 2016, DHS tested a sample of deployed explosives trace detection and bottled liquid scanner units and concluded that some deployed units for each technology no longer met detection requirements.[12]

Calibration, likewise, can demonstrate that the screening technology is at least minimally operational, but it is not designed to test whether the screening technology meets detection requirements. For example, to calibrate explosives detection systems, TSA officers are to run the manufacturer's operational test kit—which includes items of various densities—through the unit and verify that the item is correctly displayed on the system's monitor (see figure 2 below).[13] This process demonstrates a level of base functionality of the system, but it does not ensure that the system meets detection requirements. As a result, a system can pass calibration even when its detection capabilities have degraded.

[11]Calibration procedures vary in terms of frequency and type for each screening technology.

[12]According to TSA officials, the units did not meet detection requirements because they were not adequately maintained. Officials stated that the agency has since introduced better controls to ensure that routine preventative maintenance is performed as required.

[13]For the purposes of this statement, references to TSA Transportation Security Officers may include both TSA-employed screening personnel and personnel employed by a qualified private-sector company contracted with TSA to perform screening services at airports participating in TSA's Screening Partnership Program. See 49 U.S.C. § 44920.

Figure 2: Images of Calibration Procedures and Operational Test Kits Used for Explosives Detection System Technology

Source: GAO. | GAO-24-107094

TSA officials stated that there are challenges in designing a process to ensure that screening technologies continue to meet detection requirements after deployment. For example, TSA officials stated that it is not feasible to conduct live explosives testing in airports. Further, while it is relatively easy to temporarily transfer smaller screening technologies, such as explosives trace detection units, to a controlled setting for live explosives testing, it would not be feasible to transfer larger installed units, such as advanced imaging technology. However, as we have previously reported, independent test measures exist to test these technologies such as a national standard for measuring image quality in explosives detection systems.[14]

[14]GAO, *Air Cargo Security: TSA Field Testing Should Ensure Screening Systems Meet Detection Standards*, GAO-21-105192 (Washington, D.C.: July 29, 2021).

TSA Is Developing and Implementing a Process to Better Ensure Screening Technologies Continue to Meet Detection Requirements after Deployment

We made two recommendations regarding these issues in our December 2019 report.[15] The TSA Administrator should (1) develop a process to ensure that screening technologies continue to meet detection requirements after deployment to commercial airports and (2) implement that process. DHS concurred with both recommendations.

As of October 2023, TSA has partially addressed the first recommendation. In April 2020, TSA issued the *TSA Post Implementation Review (PIR) and Periodic Review Policy* (APM-20-031), which calls for TSA to develop and conduct a Post-Implementation Review—or roadmap for how TSA will assess technology performance—for each screening technology after initial deployment.[16] The policy identifies a specific timeframe for conducting this review and requires that TSA determine system performance relative to effectiveness and suitability as part of the review.

Additionally, the policy calls for TSA to conduct periodic reviews of each technology after the Post-Implementation Review, to assess system performance over time and examine whether functionality changes need to be made.[17] However, timeframes and other requirements for

[15]GAO-20-56. We also made recommendations for TSA to (1) update its guidance for developing and approving screening technology explosives detection standards; (2) require and ensure that it documents key decisions, including testing and analysis decisions, used to support the development of new screening technology explosives detection standards; and (3) require and ensure that it documents its assessments of risk and the rationale behind decisions to deploy screening technologies. DHS concurred with the recommendations, has fully implemented two recommendations, and is taking steps to implement the third.

[16]Transportation Security Administration, *TSA Post Implementation Review (PIR) and Periodic Review Policy*, APM-20-031 (Springfield, VA: April 28, 2020). The Post-Implementation Review is the first assessment of performance after the technology has been deployed to airports; it is used to determine user satisfaction, system performance relative to effectiveness and suitability, financial compliance, and to identify lessons learned. The Post-Implementation Review is to be conducted within 6 to 12 months after the technology attains Initial Operating Capability or as directed by an acquisition decision memorandum. Initial Operating Capability for software occurs when the minimum capability necessary to field (deploy) the technology is achieved. In its November 2019 concurrence with our recommendation, DHS stated that TSA decided to examine the component performance of technologies' detection chain rather than perform a direct measure of detection requirements, due to the limitations of using live explosives and simulants. A separate Post-Implementation Review is required for each screening technology because each technology has unique logistics data and a unique detection chain.

[17]According to TSA's policy, periodic reviews can be completed through a variety of technical and non-technical means, such as a program manager review, dedicated operational analysis, contractual reviews, or a review of acquisition documentation.

TSA officials reported in May 2023 that they have developed and tested a kit to measure the parameters for this image quality test.[21] We have not previously reported on an image quality standard for advanced imaging technology and plan to continue to work with TSA officials and independent experts to understand whether this test will adequately identify degradation in detection performance.

However, we continue to have concerns regarding the sufficiency of the test data collected and reported during the periodic reviews, and the absence of specific test plans to measure the detection performance of the advanced imaging and computed tomography systems.[22] According to TSA officials, while the agency remains committed to implementing its periodic review process of screening technologies, officials also said that enduring resource constraints mean TSA will likely require additional time to implement a periodic review process for all screening technologies. To fully address our recommendation, TSA should address the concerns discussed above, such as the absence of specific test plans to measure the detection performance of specific technologies. We will continue to work with TSA to evaluate the agency's progress.

[21]According to TSA officials, they have scoped a Post-Implementation Review for advanced imaging technology that is to be implemented once the standards and pass/fail criteria have been approved by a joint industry and government committee. The image quality test proposed by TSA is based on a draft national standard for image quality testing of millimeter wave screening devices—the core technology underlying advanced imaging technology systems.

[22]Because TSA deems these reports to contain sensitive information, we are not discussing the details of our assessments in this statement.

TSA Should Collect Data on and Assess the Potential for Discrimination in Its Screening Practices

TSA's Advanced Imaging Technology Can Refer Certain Passengers for Additional Screening More Frequently than Others

As discussed earlier in this statement, TSA may use advanced imaging technology as part of its primary passenger screening at airport security checkpoints (see figure 3). Passengers who trigger an alarm on the advanced imaging technology machine may be required to undergo secondary screening, which could include a targeted pat-down and, in some cases, explosive trace detection screening.

Figure 3: Advanced Imaging Technology Machine

Source: GAO. | GAO-24-107094

In November 2022, we reported that supervisory officers in all four airports we visited and Transportation Security Officers in all 12 discussion groups we conducted said that they have observed advanced imaging technology machines alarming frequently on certain passengers.[23] These include transgender passengers, passengers who wear religious headwear, or passengers with certain hair types and styles. For example,

- The officers stated that they push a blue or pink button on the advanced imaging technology machine to specify the gender passengers are scanned as, based on their visual assessment of the passengers' gender presentation. The officers stated that passengers may undergo additional screening if the gender button selected on the machine does not match the gender of the passenger. In addition, officers noted that transgender passengers may trigger alarms depending on the nature of their transition, because the technology may register potential threats in the groin and chest areas.
- The officers also stated that the advanced imaging technology cannot adequately screen certain hair types and styles (e.g., heavy braids), which can result in some passengers, including Black women, triggering alarms on the machines.
- Furthermore, officers stated that passengers who have medical conditions, prostheses, or disabilities that prevent them from holding the required position for advanced imaging technology screening (i.e., stand with their arms positioned over their heads) may be required to undergo additional screening.[24]

Some of the Transportation Security Officers we interviewed stated that these referrals for additional screening are not due to discrimination or profiling. Rather, they said that the alarms are a result of the detection of potential threats that cannot be cleared by the advanced imaging technology and need additional screening to resolve based on TSA's operating procedures. According to lead officers in one of the airports we visited, anything that differs from the technology's standard algorithm will register as a potential threat and trigger an alarm, regardless of race, religion, or other characteristics. Officers in another airport noted that passengers who are wearing baggy clothing or clothing with sequins can

[23]GAO-23-105201.

[24]According to TSA officials, individuals who cannot hold the stance for advanced imaging technology screening are considered ineligible, and the walk-through metal detector becomes the primary method of screening.

also trigger alarms. According to the officers, they are required to perform targeted pat-downs as a means of resolving alarms to help ensure that passengers are not carrying potential threat items, such as weapons, past the screening checkpoint.

Similar to the observations of the TSA officials at the airports we visited, representatives from the seven selected stakeholder organizations we interviewed said that TSA's use of advanced imaging technology affects certain passenger groups more often than others. Some of these organizations have also raised concerns about the technology in congressional hearings. Representatives from some organizations stated that the use of the technology has contributed to negative passenger experiences with the security screening process that can be perceived as discrimination or profiling. For example,

- Representatives from the National Center for Transgender Equality and American Civil Liberties Union stated that because advanced imaging technology is based on a binary (i.e., male or female) selection by the officer, transgender passengers consistently trigger alarms and are subject to pat-downs of sensitive areas that they consider to be invasive and traumatic. These representatives noted that the prosthetic devices transgender passengers may wear could also trigger alarms on advanced imaging technology machines.
- In addition, representatives from the National Disabilities Rights Network and the Paralyzed Veterans of America stated that passengers who use wheelchairs and are not able to be screened by advanced imaging technology machines, are required to undergo a pat-down, and at times may have to wait for extended periods for an officer of the same gender to conduct the pat-down.
- Further, in testimony before this Committee in June 2019, a representative from the Sikh Coalition stated that Sikhs are virtually guaranteed to receive additional screening because of their turbans, which trigger alarms on advanced imaging technology machines. According to the representative, this perpetuates stereotypes that certain passengers, including Sikhs, Muslims, Arabs, and Hindus, are security threats because other passengers consistently see them trigger alarms on purportedly neutral technology. Moreover, a representative from the National Association for the Advancement of Colored People Legal Defense and Educational Fund stated in the same hearing that Black women wearing natural or braided hair have frequently had to undergo pat-downs of their hair by TSA officers because the advanced imaging technology is unable to distinguish contraband from natural Black hair. Representatives from both of

these organizations alleged that the technology singles out and imposes burdens on specific passenger groups, which they said could be experienced as discrimination by these groups.

TSA officials stated that the agency has a Disability and Multicultural Coalition and holds annual conferences and quarterly meetings with its members. This coalition includes over 400 organizations such as the Sikh Coalition, the National Center for Transgender Equality, and the Paralyzed Veterans of America. According to three of the seven stakeholder organizations we interviewed, TSA's Multicultural and Disabilities Branches, which collaborate with the coalition, are aware of and receptive to hearing organizations' concerns.[25] However, representatives from four stakeholder organizations stated that while TSA has taken some positive steps that may help prevent discrimination, it has not made meaningful changes to address the long-standing concerns they have raised. For example, a representative from one of these organizations stated that when advanced imaging technology machines were implemented, TSA told them the technology would reduce the need for pat-downs. However, this representative believes that this has not occurred. Representatives from another organization stated that TSA's main focus is on security and reducing wait times for the general public, and not enough emphasis is placed on the civil rights and dignity of passengers with special circumstances.

We reported in November 2022 that TSA had taken some actions that agency officials said may help better facilitate screening of transgender and gender-nonconforming passengers.[26] For example, at the time of our review, TSA was in the process of developing an algorithm update for its advanced imaging technology machines which, according to officials, would increase detection rates and reduce false alarm rates for the traveling public. The update was also expected to remove the need for gender-identifying buttons on the machine. Specifically, officers would only be required to press a gender-neutral "scan" button which, according to TSA, is expected to facilitate screening of transgender passengers

[25]The Multicultural and Disabilities Branches are responsible for (1) promoting respect for civil rights and civil liberties in policy and training creation and implementation; (2) educating TSA personnel at headquarters and in the field on TSA's civil rights and liberties responsibilities to the public; (3) collaborating with organizations and advocacy groups to identify promising practices for TSA's nondiscriminatory delivery of security, custody, and customer-service programs and activities; and (4) investigating and resolving civil rights and civil liberties complaints filed by the public alleging discrimination in TSA's security screening activities at airports.

[26]GAO-23-105201.

because officers will no longer need to discern a passenger's gender prior to screening.

TSA Has Not Collected Data on Referrals for Additional Screening or Assessed the Potential for Its Practices to Result in Discrimination

In November 2022, we reported that TSA was aware of many of the concerns that stakeholder organizations had raised regarding its screening practices, but had not collected data on the extent to which its practices refer certain passengers for additional screening more than others.[27] The agency also had not conducted assessments to determine whether its screening practices comply with agency non-discrimination policies. We recommended that TSA (1) collect additional data on passenger referrals for additional screening and (2) conduct assessments to determine the extent to which TSA's passenger screening practices comply with agency non-discrimination policies to identify any needed actions to improve compliance.[28]

DHS concurred with both recommendations. In July 2023, TSA officials told us that, in June 2023, the agency completed deployment of the algorithm update to its advanced imaging technology machines at about 340 airports.[29] TSA officials stated that they collected data at 20 selected airports from May 2023 through June 2023 during its annual resource planning assessment to verify that the update was working as intended. TSA reported that preliminary results show that approximately 25 to 27 percent of passengers received a pat-down when using the updated machines at the selected airports. Officials stated that the 2022 assessment found that about 52 percent of passengers received a pat-down.

TSA officials stated that the agency also plans to collect data at selected airports where the advanced imaging technology update has been deployed using a new form that captures information on the passenger's experience during checkpoint screening. According to officials, the new form captures (1) the total screening time from travel document verification through checkpoint exit; (2) the cause of any additional screening; (3) the duration of any additional screening; and (4) any

[27]GAO-23-105201.

[28]In our November 2022 report, we also made recommendations for TSA to (1) take additional actions to better inform passengers about its discrimination complaint process and (2) strengthen its ability to analyze passenger discrimination complaints. DHS concurred with the recommendations, and TSA has taken steps to implement them.

[29]TSA reported that it is responsible for the security of nearly 440 federalized airports, as of July 2022.

qualifiers including risk status, use of wheelchair, and number of traveling companions. TSA estimated that its data collection efforts would be complete by September 29, 2023. As of October 16, 2023, we have not received documentation of the data collected.

Officials stated that TSA plans to analyze the data collected to identify the (1) rate at which passengers trigger advanced imaging technology alarms, (2) percentage of false alarms, and (3) causes of false alarms. They said that the results of this study will be cross referenced with complaint data and used to support further development of advanced imaging technology algorithms. In addition, officials noted that further research may be needed to identify root causes related to any outcomes found and to expand upon the number of data points.

In addition to its data collection and analysis efforts, TSA reviewed literature on passenger experiences and potential bias in on-person screening and issued a briefing on its findings in March 2023. The briefing summarizes common factors associated with additional screening and potential strategies for using technology and procedures to help mitigate or prevent unintended bias. Furthermore, TSA has conducted focus groups to assess the pat-down process, and according to officials, planned to issue a report summarizing the topics discussed in July 2023. As of October 16, 2023, we have not received the report.

To fully implement our recommendations, TSA will need to provide evidence that it has collected data on passenger referrals and used these data to assess the extent to which its screening practices align with its anti-discrimination policies to identify any needed actions to improve compliance. We will continue to monitor TSA's data collection, analysis, and other efforts to address these recommendations.

Chairman Gimenez, Ranking Member Thanedar, and Members of the Subcommittee, this completes my prepared statement. I would be pleased to respond to any questions that you may have at this time.

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If you or your staff have any questions about this testimony, please contact Tina Won Sherman, Director, Homeland Security and Justice, at (202) 512-8461 or shermant@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. GAO staff who made key contributions to this testimony included Christopher Ferencik (Assistant Director), Johanna Wong (Analyst-in-Charge), William Bauder, Russell Brown, Jr., Benjamin Crossley, Michele Fejfar, R. Scott Fletcher, Barbara Guffy, Kevin Heinz,

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