Center for American Progress

Keeping Bombs Off Planes

Securing Air Cargo, Aviation's Soft Underbelly

P.J. Crowley and Bruce R. Butterworth

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Introduction and Summary

At a recent hearing at Guantanamo, Khalid Sheikh Muhammad took responsibility for the so called Bojinka plot, a plan to use terrorists posing as passengers to blow up a dozen 747s simultaneously in 1995. Less well known is what the 9/11 mastermind's nephew, Ramzi Yousef (and the operational director of Bojinka) did when this first plot was foiled. He tried twice to place bombs in cargo shipments on airliners bound for the United States before he was arrested.[1] If a terrorist attempts such a plot again, there is an unacceptably high chance of success. Why? Because most cargo that flies on passenger flights receives far less scrutiny than the people and baggage traveling on the same airplane.

Due to hard work by the Transportation Security Administration's cargo security professionals, air cargo security is better than it was five years ago, but not yet good enough. Congress, following up on the outstanding recommendations of the 9/11 Commission, is considering how to strengthen air cargo security.[2] How effective new measures will be, however, hinges on this question: Should the Transportation Security Administration "screen" or "inspect" air cargo?

The difference may appear semantic, but in fact it is critical. To inspect air cargo is to examine it physically by various means, item by item, to ensure that it does not contain a bomb. Properly done, inspection gives a high level of confidence that no bomb is present. In contrast, to screen cargo is to administratively review cargo data and then inspect only a fraction of the cargo itself.

Unsecured air cargo gives terrorists an opportunity to bring down a U.S. airliner without having to board it or cross a border. Devising a bomb with a timer for a commercial shipment on a U.S.-bound passenger flight is well within the capabilities of an average engineering student.

In fact, in the 1988 Pan Am 103 tragedy over Lockerbie, Scotland, the bomb successfully detonated on the third successive flight, which would be required to get a bomb on an airliner flying either to and within the United States. Yet this year, the Transportation Security Administration, or TSA, will spend close to $5 billion securing passengers and their checked and carry-on baggage—but only $55 million on the air cargo that can fly on the same airplane.[3]

Congress should pass legislation that more air cargo be inspected, not just administratively screened. TSA should strongly embrace the vision of 100 percent inspection and use it to drive future program planning and execution.

What's worse, only 300 cargo security agents are focused on air cargo full-time, less than one percent of the TSA workforce.[4] This forces the agency to allow the 1.5 million known shippers, 3,800 freight forwarders (with 10,000 branches), and 300 air carriers that form the air cargo supply chain to largely police themselves.[5]

It is obviously impossible for TSA to effectively monitor the tens of millions of employees in this supply chain, which is why Congress' legislative choice of words is significant. A Senate bill passed in March 2007 would require the TSA to "screen" *all* domestic air cargo carried on passenger aircraft within three years. A comparable House measure, approved in its first 100 hours in January, would mandate that TSA "inspect" such shipments.[6]

The right answer is actually in between the two, but getting it right will require a broader focus, take longer and cost more than Congress currently envisions.

Administrative screening can be easily circumvented. Shipping documents are notoriously incomplete and not a sound guide for targeted inspections based on risk. With millions of shipping employees in the supply chain, there is a substantial opportunity for jihadists with no known links to terror networks to find jobs. Widespread smuggling and cargo theft raises questions about whether industry will sufficiently comply with even basic security measures.

A security system anchored by the inspection of as much air cargo as possible will be harder to defeat. Most air cargo is loose, or "break bulk" in shipping parlance, which means it can be inspected using existing capabilities. Virtually all cargo flown from smaller airports is already inspected. With appropriate resources, TSA could establish additional inspection facilities at the roughly 45 larger airports that handle 95 percent of all domestic cargo.[7]

Each TSA inspection point would have the full range of inspection capabilities; the configuration would vary from airport to airport depending on the span of operations and type of commodities typically handled.[8] A pilot program testing such a model is currently underway at San Francisco International Airport and will soon begin at Cincinnati/Northern Kentucky International Airport.[9]

But even if 100 percent inspection is the right goal, there are several problems with Congress' emerging approach. It cannot be achieved within three years. Its emphasis is on the wrong cargo. And TSA lacks the existing resources to do it.

A small but significant volume of air cargo arrives at the airport in shipping containers or on pallets, already "built-up" in shipping vernacular. No technology currently exists to effectively inspect cargo shrink-wrapped on four-foot square pallets, large cargo containers (also known as unit loading devices or ULDs), or "cookie sheets" (metal sheets on which cargo is stacked to the size of a ULD) for the small quantities of explosives that can bring down an airliner. A labor-intensive effort to break down, inspect, and reassemble shipments is impractical as a standard practice.

That's why Congress needs to allow enough program flexibility for TSA to clear some cargo for flight not through inspection, but through alternative procedures that provide the same effective level of security. Specifically, some built-up cargo will have to be "certified," based on much stronger security "up stream" all the way to the manufacturing

or production site; diverted to planes that fly only cargo; or placed in large chambers that simulate some or all of the flight itself, as the Israelis do.

Another problem: The emerging legislation focuses on domestic air cargo only, as does TSA's current strategy. However, international cargo arriving in the U.S. on all-cargo flights, and to a lesser extent on foreign airline flights, carries considerably greater risk. As with Pan Am 103, the best opportunity to attack a U.S.-flagged airliner may be before its arrival in the United States, which underscores the need to perform cargo inspections overseas, not just domestically.

Yet, today, cargo that originates overseas can be transferred to a domestic passenger airliner without being inspected. Given last summer's plot to destroy flights between Britain and the U.S., this should not be allowed to happen.

Contrary to stated concerns by government and industry officials, improved air cargo security will not create unmanageable system disruption or economic hardship. The overall economy is strong and the airline industry has recovered from the shock of 9/11.[10] But the private sector has a right to expect the government to have the necessary resources and political support to do what needs to be done.

Unfortunately, TSA in its first five years of existence has been caught between competing political philosophies of more active and smaller government. Underfunded relative to its mission, TSA has too often been forced to rob Peter to pay Paul—for example, by cutting research on explosives detection to pay employee salaries. Its screener labor force has been arbitrarily capped for ideological reasons unrelated to its mission requirements.[11]

The cargo security function within TSA has been an orphan and was reorganized three times in an 18-month period.[12]

TSA professional staff has done a lot to improve air cargo security on a shoestring budget, but TSA's leadership seems reluctant to take on additional responsibility and to battle the White House for the resources it needs to succeed. To understand exactly what TSA should be doing almost six years after 9/11, the Center for American Progress undertook a six-month review of the air cargo system, assisted by a small team of experts and by broad consultations with industry and government officials.

Our analysis focuses on the threat to passenger air travel (shipments flown on all-cargo aircraft are assessed to be a lesser concern and not directly addressed in this paper) and evaluates what is necessary given the threat. Specifically, we examined what can be done without disrupting the air cargo supply chain, and what a reasonable security regime would cost.[13]

Given renewed interest in air cargo security, what should be done now?

Summary of Major Findings

First, Congress should pass legislation that more air cargo be ***inspected***, not be just administratively screened. TSA should strongly embrace the ***vision*** of 100 percent inspection and use it to drive future program planning and execution. Congress, however, should not set a counterproductive deadline. While considerable progress can be attained within three years, the capability to inspect all air cargo will take up to 10 years to achieve.

Second, TSA should assume direct responsibility for inspections and not

delegate the job to the private sector. TSA should more aggressively adapt the flow of air cargo at airports to fit security requirements. By establishing government-run inspection facilities at major airports, TSA can at least double the volume of cargo inspected within three years using existing inspection technologies and procedures.

Third, solutions must be international, not just domestic. The United States should encourage adoption of stronger global air cargo security standards through bilateral agreements and also through appropriate international bodies. The objective should be to increase inspections (or the limited use of strong alternatives to inspections) overseas as it has in other transportation sectors. In the meantime, all uninspected international air cargo arriving in the United States and scheduled to be transferred to domestic passenger flights should be inspected first, with particular emphasis on shipments arriving on all-cargo aircraft.

Fourth, Congress should establish a separate budget line for air cargo security and beginning in fiscal year 2008 provide up to $600 million per year for more extensive operations, additional facility and equipment needs and roughly 4,000 more personnel. In addition, the Department of Homeland Security's Transportation Security Laboratory in Atlantic City, N.J., should receive dedicated and sustained funding to develop the means to fill remaining inspection gaps and research next generation explosive detection technologies.

On September 11, the United States suffered a "failure of imagination."[14] When it comes to closing the remaining major vulnerability within aviation security before it can be exploited by terrorist networks, what the United States cannot afford is a failure of action.

Air Cargo: Aviation Security's Soft Underbelly

In the immediate aftermath of September 11, there was an urgent and needed focus on aviation security. Nineteen suicide hijackers had defeated the existing defenses of passenger air travel and dramatic changes were necessary.

In the five years since then, more attention has been paid to the security of passenger air travel than any other mode of transportation security.[15] As anyone who has flown recently knows, change has been tangible around the nation's 450 airports and in the air as well.

Passenger and baggage screening has been taken over by the federal government and is far more intensive. Cockpit doors have been hardened and flight crews armed. Federal air marshals are on many flights. And passengers are alert for suspicious activity, in some cases overly so.

More technology is also being introduced at security checkpoints, although gaps still exist. The pre-screening of passengers against known terrorist watch lists is still a work in progress, but may now be moving in the right direction. All checked baggage and carry-on baggage is inspected using a variety of technologies and in rare instances canines.

Yet the same cannot be said about air cargo that is carried on thousands of passenger flights to, from, or within the United States every day. While security of cargo on passenger flights is better than it was on September 11, and stronger than is generally understood, significantly more can and should be done.

Recent Legislative Action

In early 2007, the 110th Congress refocused on the need to strengthen air cargo security within the context of full implementation of key recommendations of the 9/11 Commission. In response, officials of the Bush administration, the Transportation Security Administration, or TSA, and the airline industry expressed skepticism that such a goal is achievable or even necessary.[16] Action is appropriate and long overdue.

The House passed the 9/11 Commission Recommendations Act of 2007 (H.R. 1) within the first 100 hours of the 110th Congress. The legislation includes a provision that would mandate 100 percent inspection of air cargo transported on passenger aircraft originating in the United States within three years. The intent of the legislation is to employ "equipment, technology, procedures, and personnel" to inspect air cargo to "a level of security *equivalent* to the level of passenger checked baggage." (Emphasis added.)

The House legislation also mandates that the percentage of air cargo inspected would increase each year during the phase-in period, with 100 percent inspection accomplished by September 2009. TSA is also required to assess the risk associated with existing air cargo inspection exemptions, such as human remains and body parts, diplomatic pouches, and certain hazardous materials.[17]

The Senate passed similar legislation in March 2007, the Aviation Security Improvement Act (S. 4), which advocates less stringent standards. In this legislation, TSA must provide for the "screening of all cargo being carried on commercial passenger aircraft" as part of a system that is "*comparable* to that of checked baggage."[18] (Emphasis added)

TSA: A Work In Progress

The Transportation Security Administration was formed immediately after 9/11, consolidating a mix of resources and responsibilities within the Department of Transportation and the Federal Aviation Administration. Within a year of its formation, it was transferred to the Department of Homeland Security. It has primary or shared responsibility for the security of all transportation modes, including air, rail, surface, maritime, and inter-modal.

Aviation security is its core focus, but in many respects, TSA is a beleaguered agency. It has been asked to do many things, but operates under many constraints imposed by both the Bush administration and Congress. It has suffered from significant leadership turnover and low employee morale, recently ranked 220th for workplace favorability among 222 agencies surveyed.[19] Its strategic planning and resource allocation deserve criticism.

But in spite of turmoil and resource limitations, TSA continues to do many good things. Its recent "3-1-1" initiative in response to last August's liquid bomb plot in Britain, for example, was decisive, creative, and effective, restricting the size of liquid or gel containers passengers can bring onto a flight.

But the air cargo mission has been an orphan within TSA. Between February 2005 and September 2006, its management was reorganized three times, or every *six months*, which is hardly conducive to mission effectiveness.[20] And yet, working within an economic sector that is largely unregulated, TSA's cargo security professionals moved aggressively to subject shippers to overt *and* undercover testing.

As a result of its new security directives, all cargo is inspected at smaller airports and much more cargo inspected at larger airports.[21] Given the fact that all air cargo cannot be inspected, the certified shipper concept (see page 11) is sound, provided it is aggressively overseen. TSA is also using trend analysis to make effective use of the resources it has.

At the same time, over the past four years TSA has been able to permanently bar only eight companies from shipping cargo on passenger air carriers.[22] This is not a big enough stick to encourage the private sector to embrace stronger security standards. For the most part, TSA has the authority it needs to substantially strengthen air cargo security. What it lacks is appropriate management focus and resources that match its responsibilities. If this is corrected, the government will not only have a vital role to play but will be able to do it well, too.

Congress is right to increase the priority given to air cargo security, but its legislative approach must be realistic and sustainable. Policy development must evolve away from absolutist positions that are widely held and asserted but rarely challenged within government and industry.

At present, 100 percent inspection is not possible, but considerable progress can be made over the next three years through a revised strategy involving stronger federal action and the commitment of more resources. Nevertheless, 100 percent inspection *is* the appropriate strategic vision for air cargo security, just as it is for passenger and baggage security.

Air Cargo Supply Chain

The air cargo supply chain is large, diverse, and distributed, presenting a complex and daunting security challenge. Within the United States alone, the system includes in addition to hundreds of unregulated trucking companies:

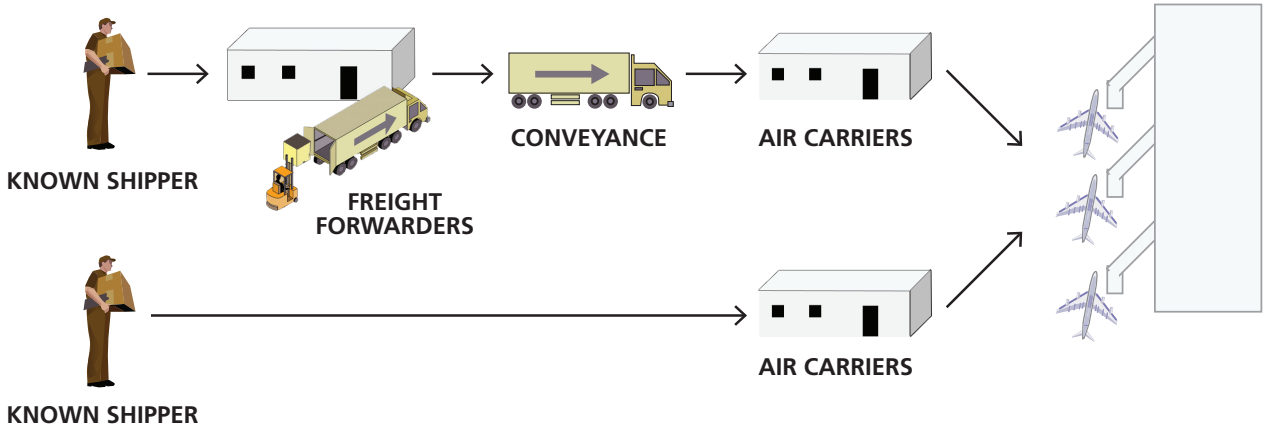
- 1.5 million known shippers, entities where air cargo originates
- 3,800 freight forwarders or consolidators (also known as indirect air carriers) that operate from 10,000 separate stations
- 300 passenger and all-cargo air carriers
- 450 airports used by airliners.[23]

On any given day, more than 50,000 tons of cargo is flown within the United States. Two-thirds of the global air cargo flow is carried on board all-cargo aircraft flown by companies like FedEx and UPS. The remaining one-third is flown on passenger flights, two-thirds of that on international and the remainder on domestic flights.[24]

While there is risk associated with a terrorist attack on any dimension of the air cargo system, the ripple effects of the destruction of a fully-loaded passenger

THE U.S. AIR CARGO SUPPLY CHAIN

Only known shippers—firms with established relationships with air carriers or freight forwarders (also known as indirect air carriers or IACs)—can have shipments placed on domestic passenger flights. Depending on cargo volume and other factors, shipments are transported directly to the air carrier's cargo facility, usually on the airport grounds, or through a freight forwarder, which can be some distance from the airport. Scores of freight forwarders can service a large airport, which makes air cargo far more complex to secure than passenger baggage.



airliner will reverberate throughout society and the global economy.[25] An attack on an all-cargo aircraft (unless a stowaway commandeers an airplane and, as in September 11, uses it to destroy a major national landmark or other critical infrastructure) is unlikely to have the same impact.

The terrorists know this. As a result, stronger security measures should be principally focused on cargo flown on passenger airliners rather than all-cargo aircraft. As a general rule, shipments flown on all-cargo aircraft do not need to be inspected.[26]

Unlike the challenge of screening air travelers and inspecting checked and carry-on baggage—almost all of which can be accomplished at the airport 60 minutes-to-90 minutes before departure—critical elements of the air cargo supply chain occur well before shipments arrive at the airport. As a result, the security system must extend from the manufacturing or production site to the cargo hold of the aircraft.

In between, of course, there are multiple points as the cargo is transported, consolidated on an air bill, trucked, and possibly palletized or containerized for flight where an improvised explosive device, or bomb, can be introduced into it. The fact that a certain amount of theft and smuggling is endemic to the air cargo system underscores the potential access terrorists have to shipments.[27]

Air cargo security has not been ignored. In fact, since 9/11, a number of actions by TSA and Congress have improved it.

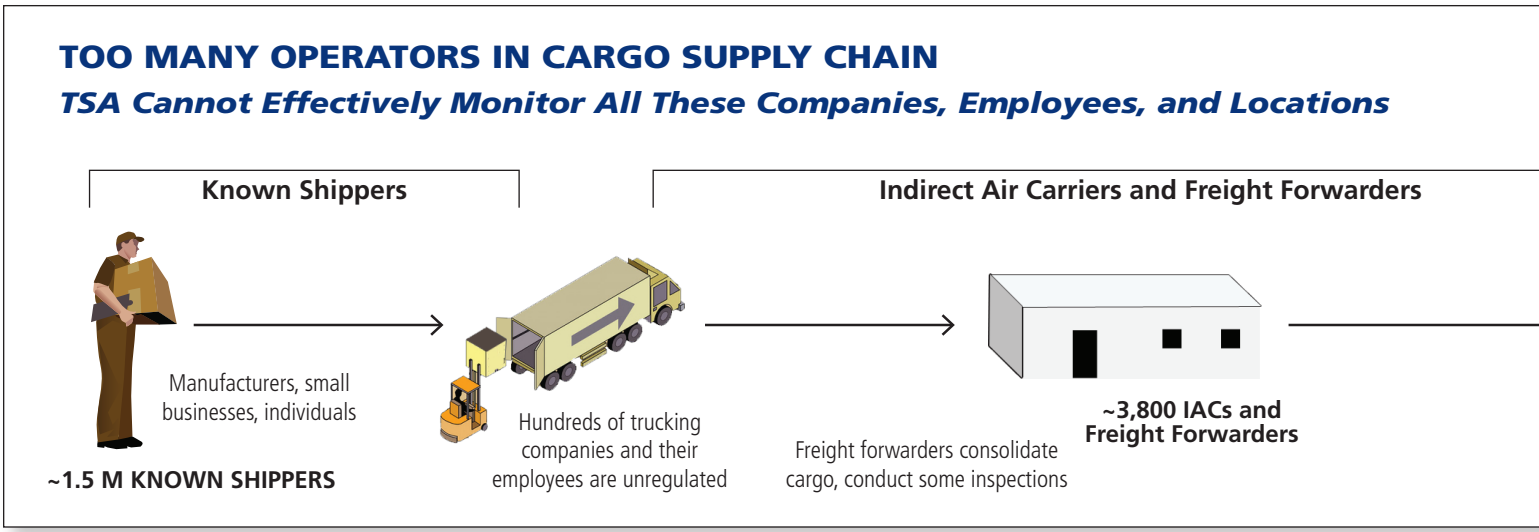
The November 2001 Aviation and Transportation Security Act, for example, mandated improved screening and inspections of passengers and property, including cargo to be carried on passenger and all cargo aircraft.[28] Later, the 9/11 Commission recommended that more attention and resources be committed to establish an improved system to "identify, track and appropriately screen potentially dangerous cargo" and the use of hardened containers to carry "suspect cargo."[29]

The Intelligence Reform and Terrorism Prevention Act that implemented many of the 9/11 Commission recommendations required TSA to issue air cargo regulations (which became effective in October 2006) and authorized additional funding, which the Bush administration has yet to incorporate into its budgets.[30] Appropriations bills in both 2005 and 2006 mandated increased levels of cargo inspections and screening by various means.[31] Though sometimes late, TSA has met these additional inspection benchmarks.

More than 75 percent of the TSA budget, or roughly $5 billion this year, is devoted to aviation security, much of it supporting the 43,000 federal employees who physically screen passengers at airport security checkpoints.[32] In fact, approximately 70 percent of all federal transportation security funding—for aviation, maritime, land and inter-modal systems—is dedicated to the pre-screening of commercial airline passengers and the inspection of passenger luggage and carry-on baggage. These are all critical security elements that have failed in the past.[33]

Yet only a small fraction of TSA's money and personnel, $55 million annually and 300 cargo security agents (less than one percent of its labor force) is focused full-time on securing cargo carried in the hold of passenger airliners.[34] This is clearly insufficient.

We must assume that al Qaeda operatives are aware of vulnerabilities in air cargo security, even if they have not yet exploited them.



What should be done depends significantly on understanding the on-going threat to passenger air travel and the air cargo supply chain. We must assume that al Qaeda operatives are aware of vulnerabilities in air cargo security, even if they have not yet exploited them.

The Threat to Passenger Air Travel

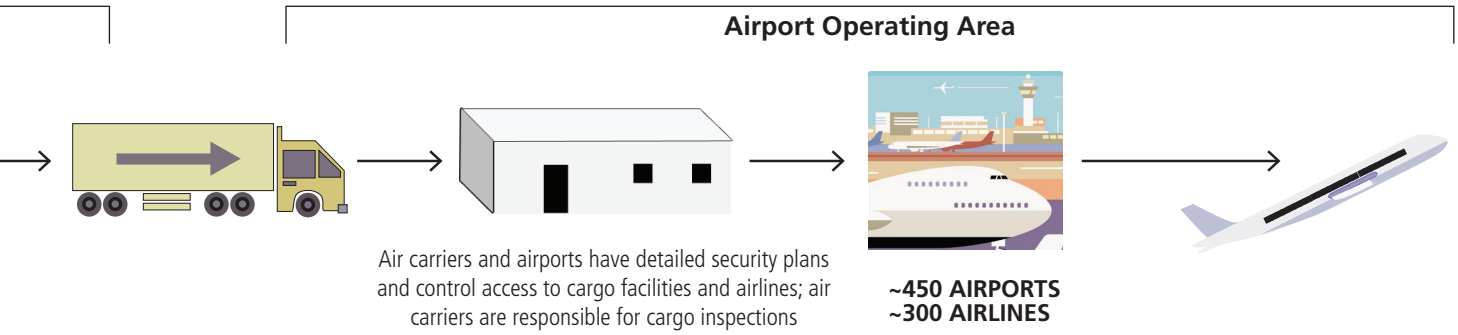
Attack scenarios can be envisioned involving a wide range of transportation systems or critical infrastructure, but aviation has clearly been a favored terrorist target for decades. It remains under threat and at risk.

While the September 11 suicide hijackings represent the most significant aviation-related disaster in U.S. history, the primary threat to airliners has been and arguably remains improvised explosive devices or bombs.[35] Libyan agents planted a bomb in passenger luggage, bringing down Pan Am 103 over Lockerbie, Scotland in December 1988.

More recently, Ramzi Yousef's 1994 Bojinka plot to destroy 12 U.S. airliners in flight first demonstrated al Qaeda's interest in aviation.[36] Even after 9/11, Richard Reid attempted to detonate explosives hidden in his shoes while en route from Paris to Miami in December 2001. A second shoe bomber, Sajiid Badat, decided around the same time not to proceed with an identical attack.[37]

Elsewhere, two Chechen suicide bombers succeeded in bringing down two Aeroflot aircraft over Russia in August 2004. British authorities intercepted a plot in August 2006 to place liquid explosive bombs on multiple airliners flying to the United States.

The ability of a terrorist to smuggle a bomb on an airliner has been reduced through more intensive inspection of passengers and their baggage. Thus, future perpetrators will look for other ways to strike. Infiltrating the employee ranks of airlines, freight forwarders, and shippers in order to evade existing security measures is one obvious possibility. A recent case where two airline customer service agents smuggled handguns, an assault weapon, and marijuana through airport secure areas and on board a flight



from Orlando to San Juan demonstrates the risks that can be posed by employees already vetted and inside the system.[38]

Planting a bomb with a barometric timer in a shipment that travels in the hold of a passenger airliner destined for the United States (even on multiple flights) is not a plot from a Tom Clancy novel. It is a realistic and executable scenario. The Pan Am 103 bomb, for example, exploded after flying from Malta through Frankfurt and London.[39]

Or consider what Ramzi Yousef, who was involved in the first World Trade Center bombing in 1993 and is now serving a life sentence, attempted to do in his Bojinka plot. He first successfully detonated a test bomb in the passenger compartment of a Philippine Air Lines flight in December 1994, placing the bomb under a seat on the first leg of the flight, getting off, and then having it detonate on the second leg. His plan was to have operatives simultaneously explode similar but more powerful bombs on a dozen U.S. airliners early in 1995.

In a chilling demonstration of al Qaeda's versatility, however, two of Yousef's secondary plots, which he turned to when his first plan was discovered, involved placing bombs in cargo shipments bound for the U.S. Given its success on 9/11, it is very likely that al Qaeda or similar groups will try to attack aviation again. And it is very possible they will view cargo as the easiest way to place a bomb on a passenger flight.[40]

Even if the United States eventually reduces the existing threat from jihadist-inspired terrorism, an unacceptable risk will remain that other terrorists will attempt to bomb U.S. airliners in flight. Given the growth of international commerce, it may be only a matter of time before such a plot involves exploitation of the air cargo supply chain. A successful attack on one or more passenger airliners will have broad and significant social and economic ripple effects. The attack itself might claim hundreds of lives, but beyond that immediate tragedy, it could again shut down the aviation system for days. Passengers may seek, at least for a time, alternative means of transportation. Financially weak air carriers could once again be pushed towards bankruptcy as they lose passengers, cargo or both.

The negative ramifications of another successful attack on passenger air travel more than justifies further action to close remaining system vulnerabilities.[41]

As we have seen in Iraq, Afghanistan, and elsewhere, terrorists are intelligent and adaptable. They will continually probe valuable and vulnerable systems to discover weak points. Securing air cargo to the same standard used to protect passengers and baggage makes perfect sense. But how we do it, particularly in the near future, will require a different approach than is now planned.

The Existing Approach

The Transportation Security Administration's stated strategic goal is to "secure the air cargo supply chain including cargo, conveyances and people through the implementation of a layered, threat-based, risk-managed security system."[42]

TSA currently lists four strategic objectives for air cargo:

- Enhance Shipper and Supply Chain Security
- Identify Elevated Risk Cargo through Prescreening
- Identify Technology for Performing Targeted Air Cargo Inspections
- Secure All-Cargo Aircraft through Appropriate Facility Security Measures.

Authorities have long recognized the value of layered defenses to counter threats. Each of these measures has merit. In contrast to its approach to passengers and their baggage, TSA's existing strategy does not place sufficient emphasis on government-managed inspections and places too much responsibility on the private sector.

Shippers and Supply Chain

TSA views its role as screening participants in the air cargo supply chain, establishing security programs for shippers, freight forwarders and air carriers, and to the extent resources permit, overseeing compliance with these programs. The farther away from the airport an air cargo operation is, the more TSA relies on the industry to monitor its own compliance with security requirements.[43]

Most of TSA's agents are located at or near airports. As a result, air carriers and indirect air carriers must verify that shippers are legitimate and comply with security requirements; screen or inspect cargo to

U.S. CARGO SYSTEMS OFFER MANY TERRORISM OPPORTUNITIES

Supply chain security must extend from the manufacturing plant all the way to the airport ramp and cargo hold of a passenger airliner. TSA, however, currently has only 300 security agents overseeing a broad and complex cargo system. With tens of millions of employees involved, there is significant risk that industry insiders can compromise cargo security without being detected by the government.

be flown on passenger aircraft; and prevent unauthorized access to cargo. Responsibilities vary along the supply chain:

- **Air Carriers.** TSA maintains the greatest contact with and strongest regulation over air carriers—passenger carriers, foreign carriers operating to and from the United States and increasingly all-cargo carriers, although scrutiny of all-cargo operations is rightfully less intensive because, absent passengers, they are less of a terrorist target. Air carriers have security programs focused on verifying the certificates and credentials of freight forwarders and known shippers from whom they accept cargo, ensuring the integrity of shipments once they arrive at the airport, and inspecting some cargo based on targeted or random selection.

- **Indirect Air Carriers and freight forwarders.** Indirect air carriers and freight forwarders generally receive cargo from shippers and "consolidate" the paperwork and sometimes the freight before delivering it to air carriers to be loaded on passenger or all-cargo flights. Roughly 3,800 indirect air carriers and freight forwarders are certified by TSA, which validates that they are legitimate businesses and vets company officers and all employees with unescorted access to air cargo. The recent TSA final cargo security rule requires indirect air carriers and freight forwarders to control access by directly observing the build-up of cargo. Cargo may be screened or inspected depending on various criteria: whether the shipment is from a new account; the description of the commodity; if it is picked up from a private residence; and the method of payment.

- **Known Shippers.** The known shipper concept originated in the 1990s and was strengthened following the 1995 Bojinka plot, which involved attempts to place bombs in air cargo; the 1996 TWA 800 crash; and again following 9/11. TSA maintains a centralized database of roughly 1.5 million known shippers, comprising a wide range of entities, including large and small businesses, manufacturers, retailers, publishers, banks, government agencies and individuals, all of which have established relationships with air carriers or freight forwarders and meet TSA security specifications. At present, carriers also maintain their own known shipper lists. Only cargo originating from known shippers can be carried on passenger aircraft. However, notwithstanding other security criteria, shippers need only establish a track record of shipments over a relatively short period of time to qualify for known shipper status, not a particularly high security standard.[44]

- **Certified Shippers.** When this new class of shippers is created by TSA within the next year, known shippers can become "certified" by voluntarily submitting to more stringent security requirements intended to create a rigorous chain of custody of shipments, particularly built-up cargo that cannot readily be inspected. Certified shippers would pay for initial certification and subsequent audits by to-be-created third-party entities. The security emphasis would be on physical security of facilities and vehicles; employee identification, vetting and training; access controls, use of tamper-evident seals or tamper-resistant technologies; and shipment tracking.

In contrast to its approach to airline passengers and their baggage, TSA's existing cargo strategy does not place sufficient emphasis on government-managed inspections and places too much responsibility on the private sector.

TSA now vets known shippers through various databases, but there is valid concern that the designation may be too easy to obtain. Air carriers and indirect air carriers are responsible for verifying known shippers, but rely on third party audits to do so.[45] The certified shipper program is envisioned as an incentive for companies willing to adopt security standards that go beyond known shipper requirements. In return, certified cargo would be subject only to secondary and/or random inspection.

While a useful concept, particularly regarding cargo that cannot be inspected, the question is how broadly should the program be applied and how strong should government oversight be?[46] Given the experience during recent financial auditing scandals, it remains to be seen whether the private sector will embrace extensive and costly audits of its operations and whether the government will commit sufficient resources to properly oversee the private sector auditors.

Cargo Screening

The existing TSA approach to air cargo security centers on administrative screening of all air cargo. This involves

The Hardened Cargo Container Debate

Part of the existing air cargo security debate regards the proper role of hardened containers, also known as hardened unit loading devices, or HULDs.

The 9/11 Commission recommended that TSA "should require that every passenger aircraft carrying cargo must deploy at least one hardened container."[47] TSA, and earlier the FAA, has successfully promoted the design and manufacture of HULDs. Made of Kevlar or other composite materials, they weigh about 30 percent (approximately 60 pounds) more than ordinary unit loading devices, or ULDs, hardly a significant weight penalty given the variability of passenger or baggage weight.

HULDs have been designed to safely contain the blast and flame caused by detonation of an explosive mass considerably larger than that which destroyed Pan Am 103. An ordinary ULD provides no blast or flame containment.

The use of hardened containers would complement inspection, making it more effective and efficient. In addition to reducing the risk of catastrophic damage to airliners, HULDs can substantially reduce inspection costs. Using HULDs, the so called threat-mass threshold for explosives detection systems can be raised slightly. The higher that threshold, the lower the false alarm (false positive) rate.

Because much of the cost of inspection is attributable to resolving false positives, even slight increases in the detection threshold can result in substantial cost savings, primarily by reducing the staff required for secondary and tertiary inspection. Hardened containers would have minimal impact on airline cargo capacity and fuel usage.

There are valid concerns about the cost of managing the employment and movement of hardened containers through the cargo supply chain. If properly integrated into the system, however, the security benefits should outweigh the cost.

The Bush administration and some in Congress object to government-mandated use of HULDs because most domestic passenger aircraft are narrow-bodied jets (such as the Boeing 737, Airbus 320, and smaller models which dominate domestic flights) that are not even configured for unit loading devices. Design concepts for hardened containers to be installed in narrow-body aircraft have been developed, but no prototypes yet exist.

Research should continue on smaller hardened containers that could be applicable to narrow-bodied aircraft in the future, with government and industry sharing the cost of development and deployment. In the meantime, HULDs can play an important security role today on wide-body passenger aircraft that fly to, within, or from the United States. Cargo on international flights presents a very real vulnerability.

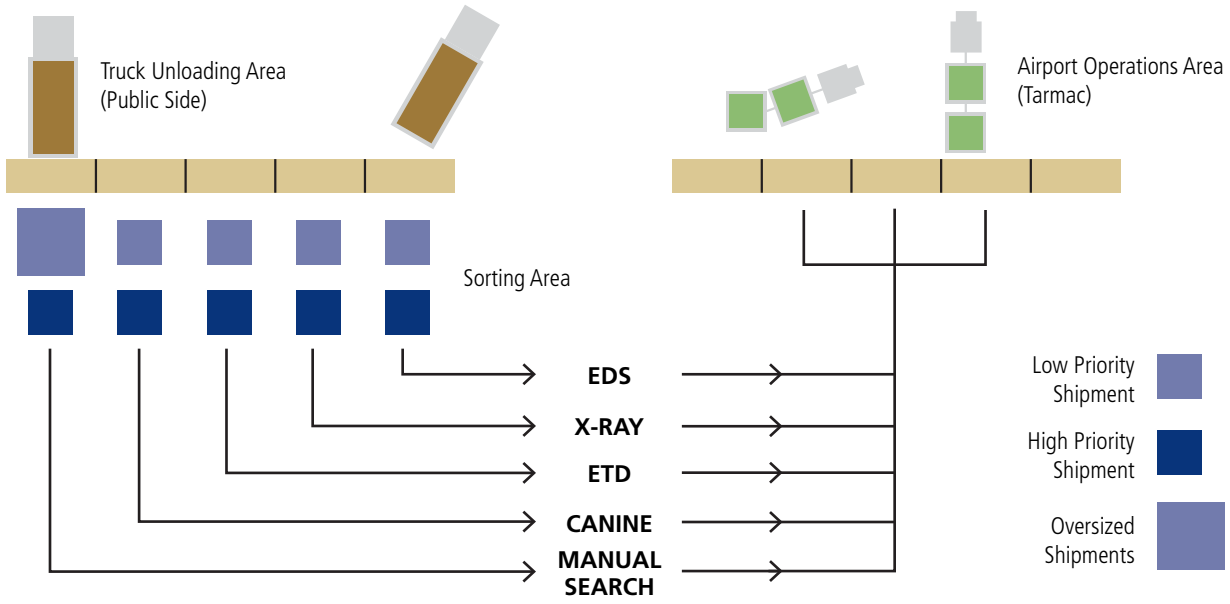
the profiling of cargo data on shipping documents and in existing databases according to a number of risk factors, such as who is shipping what and how much in advance is known through the supply chain about where the shipment is going and how it will get there.

TSA currently subjects a certain percentage of all cargo shipments to targeted and random inspection.[48] By 2008, the TSA plans to improve this process by implementing its forthcoming Freight Assessment System, which will pre-screen domestic cargo in a fashion similar to the Customs and Border Protection Automated Targeting System. The TSA's new pre-screening system will make risk assessments of international cargo flowing to or through ports of entry via land, sea and air.

In today's just-in-time world in which businesses operate, TSA believes that the chance that air cargo will be identified for additional, time-consuming, and labor-intensive inspection will spur the voluntary adoption of and broad compliance with stronger security standards such as those in the certified shipper program.

But screening works only if cargo data are complete, accurate, and meaningful. In contrast to international shipping

HOW A CARGO SCREENING FACILITY CAN FUNCTION



CARGO IS PROCESSED BY APPROPRIATE INSPECTION TECHNIQUE

EDS: Automated explosives detection; expensive
X-Ray: Requires trained screener; less expensive
ETD: Labor intensive but effective if sample taken from bomb packaging
Canine: Trained teams effective for short periods under favorable circumstances
Manual Search: Labor and training intensive; used where technology is unsuitable

documents that are standardized because of customs requirements, the amount and quality of information about domestic shipments varies widely.

In fact, existing shipping documents may not reflect all conveyors that have had access to a shipment before its arrival at the airport. Even though a large number of international shipments continue on domestic flights, significant effort will still be required over several years to build a domestic system that generates the kind of detailed and complete information upon which to develop credible air cargo risk assessments.

Cursory government oversight carries the unacceptable risk that saboteurs will find ways to manipulate or evade security measures.

Screening also requires meaningful carrots and sticks to reward those companies that integrate stronger security practices into their operations and give them real competitive advantages over those that do not. Given the length and the breadth of air cargo supply chains—hundreds of air carriers, thousands of freight forwarders, tens of thousands of shipping facilities, hundreds of trucking companies, and millions of employees in the United States alone—there are too many moving parts to monitor effectively.

The mixed history of industry compliance with prior security regulations and directives makes private sector self-policing a questionable tactic. Occasional TSA off-airport inspections through blitz or special interest inspections, followed by counseling sessions, administrative notices and civil penalties are not adequate. In some cases, TSA has barred companies from shipping cargo on passenger air carriers, but the modest number (eight in four years) is as much a measure of the limit of what only 300 agents can accomplish as it is a reflection of private sector compliance.[49]

Such cursory government oversight carries the unacceptable risk that saboteurs will find ways to manipulate or evade security measures. Thus, while still useful, screening should supplement, not supplant, inspection as a means of clearing air cargo for flight.

Targeted and Random Inspections

In recent years, TSA has measurably increased the number of shipments that it inspects, through targeted inspections based on various risk factors and random inspections of a fraction of cargo listed on every air bill or shipping document. In addition, all cargo flown from smaller (Category III and IV) airports and all cargo tendered directly at airline counters are inspected and treated in a manner similar to checked passenger baggage.

Existing capabilities include:

- **Explosives Detection Systems.** A recent Transportation Security Laboratory survey found that existing explosives detection systems can physically process between 75 percent and 89 percent of all break bulk air cargo. However, this does not ensure it will be effective in detecting a bomb. The penetrating capability of explosives detection systems is limited by the X-ray source voltage, the highest at present being 180 kV. Fortunately, explosives detection systems are designed to sound an alarm when objects cannot be penetrated; an alarm only means that another inspection method must also be employed.

- **X-ray systems.** X-ray systems can be effective in screening cargo which is either low density, such as cut flowers, or identical from unit to unit.

Inspect or Screen: What is the difference?

The 9/11 Commission Recommendations Act of 2007 (H.R. 1) calls for 100 percent inspection of air cargo. The Aviation Security Improvement Act (S. 4) would require the screening of all cargo.[50] Is there a difference? The short answer is yes.

In 2001, the TSA Chief Counsel interpreted "screening" in the context of the Aviation and Transportation Security Act as "not limited to inspection, but may include a variety of methods for evaluating persons and property." Based on this opinion, TSA has taken the position that identifying cargo as coming from a known shipper constitutes screening and further inspection may not be required.[51]

But the terms *screen* and *inspect* describe different security functions and, depending on the origins and sophistication of the threat, yield varying levels of confidence that cargo is safe to fly on passenger aircraft.[52] A security system anchored by the inspection of as much air cargo as possible will be harder to defeat than a system based on screening.

To inspect air cargo is to examine it physically, item by item, to ensure that it does not contain a bomb. This is done by scanning the item with explosives, detection systems, or X-ray equipment; by manually opening the item and searching its contents with the assistance of explosives trace detectors; or by having trained dogs sniff it. Properly done, inspection gives a high level of confidence that no bomb is present.

TSA uses the term screening to cover a variety of actions. They include: overseeing industry implementation of new security requirements; maintaining a database of known shippers; vetting cargo supply chain employees who have access to shipments; making cargo risk assessments; mandating random and targeted cargo inspections that are performed to some extent by TSA, but mostly by the private sector; and selectively testing a narrow portion of the system for compliance.[53]

TSA's air cargo security final rule that went into effect in October 2006 requires aircraft operators to ensure that cargo is "screened and inspected."[54] This is confusing. If inspection were really the standard, then there would be no need for further legislation. Rather, the emerging security regime only requires the airlines to inspect a fraction of cargo carried on passenger flights.

Even in these limited cases, however, procedures for effective employment need to be developed. If a shipment is opaque and cannot be screened by an explosives detection system, it is also unsuitable for inspection using a conventional x-ray system.

- **Explosive Trace Detectors.** Explosive trace detectors, or ETDs, can be effective as long as access to contaminated surfaces is available. Effectiveness improves dramatically when samples are taken off the packaging of improvised explosive devices. Their performance depends on the type of explosive. Based on experience with checked baggage, careful attention must be paid to the manner in which samples are acquired for analysis. ETDs can require an appreciable commitment in manpower to effectively screen cargo.

- **Manual Searches.** Effective manual searches require that screeners be carefully trained on improvised explosive devices and how to identify them. Even more so than ETD screening, manual searches are labor-intensive and time-consuming. Proper training is vital. And even then, certain classes of cargo are best inspected through technical means.

- **Canines.** Dogs can screen large amounts of material very quickly and are very adept at identifying scents

on which they have been trained, which makes them useful for detecting certain forms of explosives under favorable circumstances. But canines are effective only for brief periods of about 20 minutes to 30 minutes. While their olfactory capability far exceeds that of humans, dogs can pick up inadvertent human cues that influence their performance. Poorly designed operational tests may overestimate their effectiveness. Dogs can also be effectively used with cargo to be loaded onto all-cargo flights, where if properly trained, they could detect a stowaway who could reach the cockpit, a risk unique to all-cargo aircraft.[55] At present, TSA focuses its canine teams on explosive detection.

Not all cargo can be inspected. A small but significant volume arrives at airline and freight forwarder facilities already built up on pallets or placed in shipping containers.

While the volume of cargo actually inspected has been increased, more can be done. How could this be accomplished?

Most air cargo arrives at the air carrier or freight forwarding (indirect air carrier) facility as individual packages or "break bulk." While a small percentage may be designated for the next flight out, or NFO in industry-speak, there is generally sufficient time available for most cargo to be inspected. And, within the United States, almost all passenger flights involve narrow-bodied aircraft that cannot accommodate containerized or built-up cargo.

In addition to inspections already being accomplished at smaller airports, by concentrating on larger Category X and I airports (the top 45 airports process roughly 95 percent of all air cargo), TSA could at least double the amount of cargo being inspected. However, a different model will be required than is currently being followed.

At the same time, not all cargo can be inspected.[56] Some cargo is legitimately exempted from inspection, such as diplomatic pouches or human remains. A small but significant volume of cargo arrives at airline and freight forwarder facilities already built-up on pallets or placed in shipping containers.

In many cases, this cargo is shrink-wrapped or banded and cannot readily be inspected using the existing capabilities listed above. Better technology may be developed in the future that can inspect large shipments (applied research is already underway at the Transportation Security Laboratory in Atlantic City, N.J.). But this is unlikely to be available and deployed within three years to enable built-up cargo to be inspected to the same level as passenger checked baggage.

Breaking down this cargo for inspection may be required in specific cases, such as uninspected international cargo arriving in the United States to be transferred to domestic U.S. passenger flights primarily from all-cargo aircraft, but also foreign-flagged passenger airliners. Such a time-consuming and labor-intensive step is impractical, however, on a system-wide basis. As it is, TSA and the airlines are struggling just to manage the inspection of passenger bags and percentage of air cargo that is currently being manually inspected or fed through explosives detection systems that still sit in the middle of busy passenger terminals.

In short, there is no existing excess capacity to inspect significantly more air cargo than is done today. For cargo that cannot currently be inspected using existing capabilities, a certification process as envisioned in the Certified Shipper program

is a reasonable interim alternative. But it must be understood that certification of cargo by a shipper, freight forwarder or air carrier does not provide a level of security comparable to cargo inspected by a government agent.

For a cargo certification program to yield at least a minimal level of confidence that cargo is safe to fly on passenger aircraft, TSA must validate the adequacy of shipper security procedures and conduct regular compliance inspections directly or through a qualified third-party agent who is responsible to the government, not the cargo industry.

Facility Security

At the airport itself, TSA security measures focus on physical security, controlling access to airport cargo facilities, the airport ramp, and the aircraft themselves. Assuming that air cargo has been subjected to adequate security controls throughout the supply line, the TSA security emphasis is to ensure that the integrity of the shipment is not compromised by a saboteur immediately prior to being loaded on a passenger aircraft. Various security measures are directed at:

- **Airport Facilities.** Airports have mandatory security programs, to control access to airport facilities, ramps and aircraft, and to vet, train, and credential all employees who have access to cargo, facilities, and aircraft. Airports are also required to maintain perimeter security.

- **Cargo.** TSA conducts regular inspections at airport facilities; canine teams at airports spend 25 percent of their time inspecting air cargo. Cargo that is currently exempted from inspection, including built-up cargo, is subject to visual inspection. Tamper-evident seals are currently being tested.

- **Employees.** All employees with access to critical facilities and operations are required to undergo security threat assessments, which involve name checks against known terrorist databases, and also background and criminal history checks. They undergo security awareness training and are issued access badges. Eventually, such employees will receive biometric credentials. After an extensive delay, the Department of Homeland Security is beginning to implement the Transportation Worker Identification Credential, a version of which will be employed within the aviation system.[57]

Facility security is vital, but not foolproof. Even with the requirement for background checks, regular security sweeps at airports identify employees with access badges who should not qualify for employment in sensitive locations, including individuals with criminal backgrounds and illegal immigrants. Such employees might be vulnerable to coercion or co-option, whether or not sympathetic to terrorist movements. The air cargo system experiences widespread theft and smuggling sometimes linked to organized crime and often to drug trafficking.[58]

A bomb capable of destroying an airliner can be surprisingly small.[59] This makes it easy to smuggle into a nominally secure cargo facility. TSA has recognized this danger and inspects airport workers at entrances to secure areas. These inspections, however, are random and cover only a small portion of airport workers.[60] No such inspections are performed on employees of cargo shippers.

The trustworthiness of employees who have access to air cargo, and thus are in a position to place bombs in it, must be determined with high confidence. A single criterion, such as the absence of a criminal record, is not sufficient. As existing government security clearance backlogs suggest, it is also doubtful that detailed background checks on the millions of employees working for shipping entities can be performed within a reasonable length of time and at an affordable cost.

Finally, it is unclear whether the intelligence community has sufficient knowledge of terrorists to be able to construct a profile of those who might be terrorism-prone, to inform the vetting process. Counterterrorism officials in Europe have all but given up on profiling.[61]

While the existing TSA approach has improved air cargo security to a noticeable degree since 9/11, it is at best a partial solution based on a series of questionable assumptions. TSA assumes it can effectively oversee the sprawling air cargo system at arms length, and must only be concerned with domestic shipments. This is dangerous.

There are too many people associated with air cargo at its various interchanges for TSA or designated third parties to monitor. The risk of industry insiders evading self-policing measures is simply too great. The system is moving too rapidly to expect pre-screening to generate meaningful risk analysis. What is needed is a strategy that places greater emphasis on inspecting cargo rather than screening people.

A Long-Term Air Cargo Strategy

Almost six years after September 11, the United States remains at risk. The existing terrorist threat to aviation will almost certainly extend well beyond the current phase of jihadist extremism. Given stronger border security and passenger screening, including more intensive inspection of all passengers and their checked and carry-on baggage, it is reasonable to conclude that adversaries will look for other ways to attack aviation in the future.

Placing a bomb in a commercial shipment via global supply chains is an obvious and feasible means to bring down a U.S. airliner without having to board it or even enter the United States. It is already a part of the terrorist playbook.

Given the magnitude and complexity of global supply chains, air cargo security ***must*** be given higher priority and strengthened significantly. But rather than seeking perfection, policies must be realistic and focused on achieving as much progress as possible in a limited time. Ideally, the government and various industry stakeholders would share a long-term perspective of what is needed, but it is far more likely that government must lead the way.

Various industry leaders, backed by senior government officials, consistently say that inspections will significantly disrupt air cargo supply chains. These concerns are overstated. In countless areas of commerce over the past five plus years, the government has raised security mandates and the private sector has adapted effectively (as long as government security guidelines are clear and can be integrated into existing operations).[62]

Security and efficiency can be mutually-reinforcing objectives. What the private sector really needs is a government partner that is willing to meet its obligations and make the necessary investments

to incorporate greater security within the existing air cargo transportation system.

A Change in Approach

TSA's existing strategy is driven by a pre-9/11 mindset that, overly influenced by budgetary constraints, overestimates what the private sector is willing to do and understates what the government must do to protect and secure vital sectors of the U.S. society and economy.

Change is necessary. Air cargo security is "better than it was," but not good enough. Congress is right to increase the priority given to air cargo security. Any new approach must be realistic and sustainable and incorporate the following fundamentals:

- The heart of air cargo security should be inspections, not administrative screening
- TSA must assume direct responsibility for inspections and not delegate the job to the private sector
- More attention must be paid to uninspected cargo that originates overseas and carries greater risk
- Improved air cargo security will require time and careful planning, technology and resources.

Inspect Everything That Can Be Inspected

Effective inspection must be the rule, not the exception. While 100 percent inspection may not be achievable in the near term, 80 percent-to-90 percent cargo inspection is a legitimate intermediate target, at least double the level performed today. The guiding principle should be that all cargo that can be inspected should be inspected. At the same time, TSA and Congress should strongly embrace the vision of 100 percent inspection and use it to drive future program planning and execution.

Substantially more cargo can be inspected than is currently the case by using existing capabilities, although increases in personnel and budget will be necessary in line with this additional workload. Through a combination of recent Congressional mandates and aggressive policymaking by TSA's professional staff, a substantial fraction of air cargo carried on commercial passenger aircraft is already inspected. Virtually all cargo is already inspected at smaller airports.

Change is necessary. Air cargo security is better than it was, but not good enough.

A new system based on a greater fraction of cargo inspections should focus on both the materials being shipped and on using and increasing the ability of human inspectors, canines, and technologies to conclude with a high level of confidence that specific cargo does not contain an improvised explosive device. Unlike passenger baggage, the inspector can look at cargo information to compare what he is seeing with what he is supposed to see.

Security protocols should match inspection methodologies to the specific commodity and to how it is being shipped. For example, of the goods that tend to be shipped by air, flowers, fish or other perishables, electronics, and printed matter all have different characteristics that are best handled by different sets of specific technologies. A comprehensive but flexible approach should produce relatively quick progress that addresses the most serious gaps.

Cargo that cannot be inspected to an adequate level of confidence can be handled through other means, perhaps by

redirection to non-passenger aircraft. Another option used by Israel (among other countries) is to place cargo in large (and expensive) chambers that simulate some or all of the flight itself. Such steps should be carefully studied and take into account the long-term threat and system demand.

TSA Must Be Responsible for Inspections

Notwithstanding the long-term potential for homegrown terrorism, the greatest threat to passenger aviation will continue to exist overseas for the foreseeable future.

The federal government is responsible for the security of the U.S. aviation system and all of its elements: passengers, baggage, and air cargo. The underlying emphasis in recent legislation is to lift air cargo security to a level "equivalent" or "comparable" to that of passenger baggage. If this is the intent, then this responsibility must rest with TSA. It cannot be delegated to the private sector.

Given the inherent volatility of the airline industry, market forces alone are unlikely to produce the fundamental changes required to improve air cargo security. Rather than simply overseeing industry compliance with regulations and security directives, TSA must be a full participant, not merely an auditor.

Specifically, TSA must act more proactively to incorporate sound security practices into cargo operations. The risk posed by air cargo should be ameliorated just as it has for passenger screening and baggage inspection.

TSA must directly manage the cargo inspection regime. If it cedes responsibility for inspections to the private sector, the security system becomes more vulnerable to compromise, particularly from supply chain insiders. If they know how security is being applied, they will know how to defeat it. In contrast, uncertainty complicates the attackers planning.

Because the private sector will still have major security responsibilities under the certified shipper programs, TSA must be able not only to inspect cargo, but also to oversee regular third-party audits of program participants and frequently test the multi-layered system it is putting in place.

International Cargo Carries the Greatest Risk

Both the House and Senate legislation regarding air cargo security apply only to passenger air cargo that originates in the United States. This focus is too narrow. The United States is a global trading nation and the air cargo supply chain is second only to maritime supply chains in importance to our society. If we follow a genuine risk-based approach, then critical actions must take place at home and around the world.

Every day, tens of thousands of tons of containerized air cargo arrive at major airports such as Los Angeles, Chicago O'Hare, New York JFK and Anchorage, Alaska from overseas, most on all-cargo aircraft (and therefore uninspected) and some on U.S. and foreign passenger airlines. The security standards for the cargo arriving on passenger flights may meet existing International Commercial Aviation Organization security standards, with all of it pre-screened and a portion inspected.

Nevertheless, much international cargo is transferred to domestic passenger flights without being inspected. While administratively screened through the U.S. Customs and Border Protection's Automated Tracking System, this cargo is physically inspected (if at all) only when it arrives at its final destination. The existing security presumption that cargo is safe to fly within the United States if it has already

flown once is not backed by real-world experience—as the bombing of Pan Am 103 proved nearly 20 years ago.

The Department of Homeland Security and Congress must take the same approach to air cargo as security for other global supply chains, putting strong emphasis on actual inspections. One working model is the approach the United States took with respect to maritime security.

First, the United States promulgated its own strengthened regime through the Maritime Transportation Security Act. Then, working cooperatively through the International Maritime Organization, similar security standards were incorporated into the International Ship and Port Facility Security code. Further action has been taken on a bilateral basis as an increasing number of public and private entities cooperate through the U.S. Container Security Initiative and the Customs-Trade Partnership against Terrorism programs.

In aviation security, bilateral arrangements have yielded effective results in the past and should be fully explored. Until stronger international security standards are implemented, however, uninspected international shipments must be inspected when first arriving in the United States, before being placed on domestic passenger flights. For this important percentage of cargo, shipments in containers or other built-up cargo will need to be broken down, a time-consuming but necessary step. This requires improved communication and cooperation between TSA and Customs and Border Protection.

Notwithstanding the long-term potential for homegrown terrorism, the greatest threat to passenger aviation will continue to exist overseas for the foreseeable future. Numerous catastrophic attacks and thwarted plots over decades, support this judgment. Much of the planning of the 9/11 plot took place overseas. Rising Islamic radicalization in Europe, including in Britain, France, the Netherlands, and Germany, increases risk from air cargo on international flights destined for the U.S. TSA should request periodic threat assessments from the intelligence community and adjust its approach accordingly.

Time, Planning, Technology, and Resources

The air cargo security challenge is in many respects more complex than passenger and baggage inspection. Critical activities occur well away from the airport. While much more can and should be done, achieving the security standard established in recent legislation will take more time, careful planning, new technology and a greater commitment of resources than Congress envisions.

Thus, while 100 percent inspection is the right long-term goal, it will take longer than three years to actually achieve. As previously discussed, not all cargo can be inspected using today's capabilities. Also, it will be a decade or more before airport infrastructure catches up with new security requirements and enables TSA to deploy new technology that can improve both security and efficiency. A labor-intensive effort to break down consolidated shipments for inspection and then rebuild them as a standard practice is impractical.

An arbitrary deadline would be counterproductive. The capabilities of existing systems would likely be inflated and the verification of performance shortchanged. Chances are also high that insufficient attention would be paid to inspection pro-

tocols and personnel acquisition, training and integration would be shoddy.

The Department of Homeland Security, still a relatively new and maturing department, has yet to demonstrate the strong management necessary to direct complex project in a time-constrained environment. TSA has already suffered costly management mistakes when it attempted to assemble a new federal screening force against an unrealistic deadline. Millions of dollars were wasted and TSA is still coping with efforts to stabilize this labor force.[63]

If time and technology are obstacles, insufficient resources and institutional resistance should not be.

From its genesis in the aftermath of the 9/11 tragedy, TSA has been caught between competing philosophies: of a federal government that should do more and a federal government that should be smaller. TSA has suffered from a high turnover rate in its senior management and in its civil service ranks. Its screener manpower has been capped for ideological reasons, without regard to its overall responsibilities.

TSA is a hesitant and reactive agency while it needs to be a confident and forward-looking agency, willing to battle bureaucratically for the resources needed to accomplish its mission. For example, when the issue of 100 percent inspection surfaced early in 2007, TSA responded that air cargo security can only come at the expense of passenger security. This is entirely the wrong approach.

A significant increase in the security standards for air cargo, such as a regime that relies more heavily on inspections, will require a commensurate increase in personnel, equipment, facilities, and budget. There is no existing excess capacity. The TSA cargo security managers conduct as many cargo inspections and security audits as they can, given their resource constraints. A sustained and dedicated effort must be directed to future capabilities, reversing an existing trend where research and development funding for better systems tomorrow is siphoned away to pay for operational costs today.

Case in point: The budget for the Transportation Security Laboratory should be increased in order to promote the development of future inspection capabilities as quickly as possible.

The fact that 100 percent inspection may not be feasible today must not be used as an excuse for inaction. The key is to plan for the long-term now and keep making progress towards the ultimate goal.

Specific Recommendations

Beyond these major policy elements—a strong and direct federal role, more inspections, an international approach, and resources to match the desired results—there are a number of specific actions that the Department of Homeland Security, TSA and the Congress can take to strengthen air cargo security.

1. **At least double the volume of air cargo inspected within three years by establishing government-run inspection points at major airports, tailored to local security requirements.**

The emphasis over the next three years should be progress, not perfection. One hundred percent inspection is the right

long-term goal, but not realistic in the near-term. With additional resources (see Recommendation 7), TSA can at least double the amount of cargo inspected over this period employing existing technologies.

TSA can best accomplish this by concentrating on the roughly 45 Category X and I airports from which 95 percent of all air cargo is flown. These should be government-run operations, but involve working with local stakeholders. TSA should establish tailored security operations at each airport. Security plans should be based on detailed commodity, form, priority, and routing analysis.

For example, more TSA inspection stations will be required in Los Angeles or Chicago than Cincinnati, given the array of air carriers and freight forwarders that operate there. All TSA inspection points should be fully equipped, but there may be more x-ray systems deployed in Miami to inspect flowers and more explosives detection systems in San Francisco for electronic cargo.

To the extent possible, specific commodities should be matched with inspection technology or other capabilities that yield the highest possible confidence that specific cargo is safe to fly. A flexible system is also better able to handle cargo with different priorities, such as cargo scheduled to fly on the next flight out as opposed to cargo that will sit for a day or two before moving.

2. **DHS should request a National Intelligence Estimate on the mid- to long-term threat to passenger air travel.**

The Department of Homeland Security says it is following a risk-based strategy. The first element in determining risk is the actual threat. Future efforts to secure air cargo should be based on actual intelligence that has been approved by the Director of National Intelligence and represents the best judgment of the intelligence community.

DHS should request that the National Intelligence Council develop a National Intelligence Estimate regarding the threat to passenger air travel. Specifically, our intelligence community should examine trends regarding international and homegrown terrorism, the continued attractiveness of attacks on aviation compared to other systems or infrastructure, global jihadist recruitment, emerging trends in explosives, and *particularly* the risk of insiders compromising the cargo supply chain. The NIE should also be provided to relevant Congressional committees.

3. **DHS must more fully integrate the activities of TSA and Customs and Border Protection to secure the interchanges between international and domestic flights.**

The military has recognized the value of joint operations for the past 20 years. The Department of Homeland Security needs to adopt the same mindset. While negotiating stronger global cargo standards aimed at increasing inspections or (where necessary) effective alternatives that provide the same level of security, TSA and Customs and Border Protection should more fully integrate their major airport operations so that any uninspected international cargo arriving on all-cargo aircraft, and also on foreign-flagged passenger airliners, is properly and thoroughly inspected before being placed on a domestic passenger flight.

From its genesis in the aftermath of the 9/11 tragedy, TSA has been caught between competing philosophies of a federal government that should do more and a federal government that should be smaller.

Like passengers and luggage, Customs inspections of air cargo should be performed at the first domestic stop, not the last. Given projected increases in CBP personnel, more officers should be stationed at major ports of entry. CBP officers, while looking for hazardous material and contraband, should be trained to look for explosives as well.

In addition, TSA and CBP inspection protocols and equipment must be compatible. CBP's Automated Tracking System and TSA's Freight Assessment System should be linked. This will not be an easy process, and certainly cannot be done overnight. But if done properly, a CBP-TSA partnership can be a force multiplier rather than a set of duplicative and disconnected operations.

TSA's resources must be commensurate with its responsibilities. If Congress expects more cargo to be inspected, then TSA requires roughly 4,000 additional security agents to oversee the air cargo supply chain.

4. TSA should mandate expanded and standardized domestic air cargo data collection and reporting.

In conjunction with implementation of its Freight Assessment System, TSA should work with various industry stakeholders and mandate standardized domestic cargo data collection, forms and reporting. Domestic way bills should be as detailed as international cargo documents, which adequately fulfill international customs requirements.

Like the international air bill, the domestic way bill should list details on all cargo interchanges and all entities with access to the cargo en route to the air carrier cargo facility and be available in real-time—a reasonable step given increasingly digitized supply operations. These are minimal requirements if TSA expects to be able to effectively monitor cargo flows and make accurate risk assessments regarding cargo that cannot be inspected.

5. More attention must be paid to inspection protocols, procedures and training.

Aviation and other security systems are littered with examples of well-intentioned inspection regimes that ultimately turned into "paper tigers" and provided less security than widely believed. Thus, regardless of the technology used, cargo inspections need to be effectively planned, implemented, and closely overseen.

Performance standards must take into account the ***entire*** inspection process. For example, an explosive trace detector may have an 80-percent probability of detection, but its detection performance may be reduced to less than 20 percent if the operator is poorly trained or doesn't know how to use trace technology properly.

Information about the security system must also be tightly controlled to reduce the potential insider and outsider threat. A bomber can easily develop a method of deception once he or she knows the method of detection.

A system is also only as good as its training program, which must have good initial instruction details on how to handle different shipments and how to utilize shipping documents. Training must also instruct on the strengths and weaknesses of specific inspection devices, including canines; and how to resolve alarms properly. There must be regular and meaningful follow-up training. The system must be routinely tested using realistic simulants and should incorporate so called "red team" assessments.

6. TSA requires greater political support and additional resources to succeed.

TSA cannot meet Congress' emerging mandate for improved air cargo security at existing resource levels. The first priority is political, not financial. The White House, DHS and Congress need to recognize TSA as a vital and legitimate security organization, just as important to the nation's homeland security as the Coast Guard and Customs and Border Protection.

TSA cannot protect air and surface transportation systems with the existing manpower ceiling, which is based on political ideology, not mission requirements. TSA's resources must be commensurate with its responsibilities. If Congress expects more cargo to be inspected, then TSA requires roughly 4,000 additional security agents to oversee the air cargo supply chain. Congress should expand TSA's manpower authorization just as it recently did for the military.

Air cargo security should also have a specific budget line in the TSA section of the DHS budget. Beginning with fiscal year 2008, Congress should appropriate up to $600 million for air cargo security to support more extensive operations, additional facility and equipment needs and more personnel. Congress should consider authorizing a security fee on all air cargo to offset at least some of this additional cost.

7. DHS must allocate dedicated research and development funding to expand inspection capabilities and keep pace with new threats.

Despite the August 2006 bomb plot discovered in Britain, the Bush administration recommended a 40 percent reduction in its Science & Technology Directorate's explosives countermeasures budget for fiscal year 2008. DHS must stop mortgaging tomorrow's capabilities to compensate for today's underfunding. More funding must be provided to counter threats the United States already faces, including money to develop, test, and deploy next generation explosives detection capabilities in order to more rapidly and effectively inspect a significantly higher percentage of cargo in all forms.

Funding for the Transportation Security Laboratory, the world's foremost center for explosives detection research and development for aviation security, should be a separate line item in the DHS budget and protected from diversions to other government entities or for other purposes. DHS should also restart its Science and Technology Advisory Committee and establish a sub-group to oversee investments in explosives detection research and development.

Work should focus on developing the ability to detect a wider range of improvised explosive devices, particularly in built-up cargo. Specifically, scientists and engineers inside and outside government should be developing commodity-specific software and procedures for EDS and ETD inspections, increasing the operating potential of EDS and X-ray systems, and developing new sample acquisition equipment for explosives trace detection. Wherever possible, performance or certification standards should be set by the government.

8. The United States must encourage stronger global air cargo security standards.

Air cargo flows through a global supply chain. From a threat standpoint, it makes little sense to shore up domestic defenses without addressing security concerns overseas. As it strengthens standards at home, the United States should simulta-

neously encourage adoption of comparable global air cargo security standards around the world that increase actual cargo inspections or limited, effective alternatives to inspection that provide the same level of security.

This can be accomplished through aggressive and innovative bilateral agreements, and also through international bodies such as the International Air Transport Association, the International Civil Aviation Organization and the World Customs Organization.

Conclusion

The threat to passenger air travel is very real. The ability of a terrorist network to introduce a shipment with a bomb into a global supply chain and on board a passenger flight destined for or operating within the United States is not far-fetched. It is well within the capabilities of a determined adversary to plan and execute. Such an attack fits existing terrorist strategies, but this threat will likely continue to exist regardless of the outcome of our nation's current military and intelligence operations against existing terrorist networks.

Congress is correct to raise the priority given to air cargo security. The Bush administration and TSA should embrace the vision of a new security strategy based on 100 percent inspection of air cargo flown on passenger airliners. Increased attention must be given to international cargo.

Yet to succeed, TSA must be provided greater political support and more resources. While significant progress can be achieved over the next three years, achieving the intent of emerging legislation within Congress—eliminating the soft underbelly of aviation by lifting air cargo security to the same level as passenger baggage—will take more time, careful planning, better technology and greater levels of resource than Congress currently envisions.

On September 11, the United States suffered a "failure of imagination." When it comes to closing the remaining major vulnerability within aviation security before it can be exploited by terrorist networks, what the United States cannot afford is a failure of action.

Endnotes

1 Daniel Benjamin and Steven Simon, The Age of Sacred Terror, p. 25.

2 Air cargo broadly speaking includes freight, express packages and mail that are carried on passenger airliners and all-cargo aircraft. Security provisions currently do not apply to shipments that weigh less than 16 ounces. The primary focus of this analysis involves air cargo that is carried on U.S. passenger flights, which we assess to involve the highest security risk. The authors believe that for the time being, the primary threat to passenger air travel rests overseas. Also, the social and economic impact of the loss of an air cargo aircraft (unless it is hijacked) would be measurably lower than that of a passenger flight.

3 Richard A. Clarke and Rand Beers, The Forgotten Homeland, A Century Foundation Task Force Report, p. 165.

4 Statement of Kip Hawley, Assistant Secretary of Homeland Security, Transportation Security Administration, before the House Committee of Appropriations Subcommittee on Homeland Security, February 13, 2007, available at http://www.tsa.dhs.gov/press/speeches/index.shtm.

5 TSA Overview Briefing to Authors, December 14, 2006.

6 The House legislation, H.R. 1, Section 406, was approved by the House of Representatives of the 110th Congress on January 9, 2007. The Senate version, S. 4, was approved on March 13, 2007. As of April 2007, no conference action has taken place to resolve differences in the two approaches.

7 Federal Aviation Administration Passenger and All-Cargo Data and Statistics, available at http://www.faa.gov/airports_airtraffic/airports/planning_capacity/passenger_allcargo_stats/passenger/media/cy05_cargo.pdf.

8 Department of Homeland Security, Science and Technology Directorate, Systems Engineering Study of Civil Aviation Security, October 5, 2005.

9 Department of Homeland Security Press Release, March 26, 2007.

10 Air Transport Association 2007 Economic Q&A and Industry Update, available at http://www.airlines.org/economics/review_and_outlook/ATA2007EconOutlookQandA.htm.

11 Paul C. Light, *Still Searching for Airport Security*, Washington Post, April 24, 2005, p. B2.

12 According to TSA and FAA officials, from a baseline structure which existed in mid-2004, the air cargo function was reorganized on/about February 2005, October 2005 and September 2006.

13 Cargo arriving on U.S. passenger flights poses the least risk, because it can be assumed that any U.S. flight would be bombed at the first opportunity, on one of its flights to the United States. This was the case in Pan Am 103, and as Ramzi Yousef planned in 1995 for US Flights to the US from Asia and also from Europe.

14 The 9/11 Commission Report, p. 339.

15 Bill Johnstone, *New Strategies to Protect America: Terrorism and Mass Transit after London and Madrid*, Center for American Progress, August 2005, p. 7, available at http://www.americanprogress.org/kf/transit_security.pdf.

16 Statement of Kip Hawley, Assistant Secretary of Homeland Security, Transportation Security Administration, before the Senate Committee on Commerce, Science, and Transportation, January 17, 2007, available at http://www.tsa.gov/assets/pdf/testimony_senate_911commission_1.17.07.pdf.

17 H.R. 1, Section 406.

18 See Aviation Security Improvement Act, approved by the Senate on March 13, 2007.

19 The 2007 Partnership for Public Service survey ranks TSA 220th (out of 222 federal agencies) in terms of best places to work. In addition to TSA's abysmal ranking, the Department of Homeland Security is listed as 29th of 30 agencies ranked in 2007 Partnership for Public Service survey. Results are available at http://www.bestplacestowork.org/.

20 According to TSA and FAA officials, from a baseline structure which existed in mid-2004, the air cargo function was reorganized on/about February 2005, October 2005 and September 2006.

21 Transportation Security Administration Press Release, *TSA Takes Significant Steps to Strengthen Air Cargo Security*, p. 2, available at http://www.tsa.gov/press/releases/2006/press_release_0671.shtm.

22 TSA Overview Briefing to Authors, December 14, 2006.

23 General Accountability Office, *Aviation Security Vulnerabilities and Potential Improvements for the Air Cargo System*, GAO-03-344, December 2002, p.4, as well as TSA Overview Briefing, December 14, 2006.

24 According to the FAA, in terms of revenue ton miles, all-cargo international carriers account for 32 percent of the market; all-cargo domestic 34 percent; international passenger flights 22 percent; and domestic passenger flights the remaining 12 percent. See CRS Report for Congress, Air Cargo Security, January 23, 2007, p. 4.

25 Dr. L. James Valverde, Jr. and Dr. Robert P. Hartwig, *9/11 and Insurance: The Five Year Anniversary*, Insurance Information Institute, available at http://server.iii.org/yy_obj_data/binary/760752_1_0/September%2011%20Anniversary.pdf.

26 In his Combatant Status Review Tribunal Hearing on March 10, 2007, Khalid Sheikh Muhammad said that "the language of the war is victims." This goal of al Qaeda, to kill as many civilians as possible with its attacks, places passenger aircraft in a risk category distinct from all-cargo aircraft. See verbatim transcript at http://www.defenselink.mil/news/transcript_ISN10024.pdf.

27 A recent case involving airline employees in Orlando who smuggled drugs and guns past existing security checkpoints is just the latest example. See Jeannette Rivera-Lyles, Pedro Ruz Gutierrez and Beth Kassab, Airline employee arrested for smuggling drugs, guns to Puerto Rico, The Orlando Sentinel, March 7, 2007, available at http://www.orlandosentinel.com/news/specials/orl-oia1-sg,0,2146601.storygallery?coll=orl-mult-headlines.

28 Public Law 107–71, November 19, 2001, Section 110.

29 The 9/11 Commission Report, p. 393.

30 See Public Law 108-458, Sections 4051–4053.

31 See Public Laws 108-334 and 109–90.

32 The President's budget request for FY2008 sent to the Congress in February 2007 includes $4.953 billion in aviation security funding for the TSA and $246 million for security and preparedness funding for the FAA, according to the Budget-in-Brief documents for both agencies.

33 R. William Johnstone, 9/11 and the Future of Transportation Security, p. 65.

34 Statement of Kip Hawley, Assistant Secretary of Homeland Security, Transportation Security Administration, before the House Committee of Appropriations Subcommittee on Homeland Security, February 13, 2007, available at http://www.tsa.dhs.gov/press/speeches/index.shtm.

35 Remarks by Assistant Secretary for Transportation Security Administration Kip Hawley, Press Conference, August 15, 2006, available at http://www.tsa.gov/press/happenings/kip_hawley_x-ray_remarks.shtm.

36 In his Combatant Status Review Tribunal Hearing on March 10, 2007, Khalid Sheikh Muhammad admitted to being a member of the al Qaeda Council and took responsibility for the planning of the Bojinka operation. See verbatim transcript at http://www.defenselink.mil/news/transcript_ISN10024.pdf.

37 Sue Clough, *British Muslim Planned Second Shoe Bombing*, Daily Telegraph, January 3, 2005.

38 *A Huge Hole in Airport Security*, New York Times, March 16, 2007, p. 31.

39 George Lardner Jr., *2 Libyans Indicted in Pan Am Blast*, Washington Post, November 15, 1991, p. A1, available at http://www.washingtonpost.com/wp-srv/inatl/longterm/panam103/stories/libyans111591.htm.

40 Daniel Benjamin and Steven Simon, The Age of Sacred Terror, p. 20–25.

41 According to ABN-AMRO Incorporated, the airlines lost at least $270 million in revenue for each of the days the industry was shut down following 9/11. It noted the potential loss in consumer confidence because of the attack. See Recent Developments Expected To Produce Large Industry Loss, available at http://commerce.senate.gov/hearings/092001Reidl1.pdf.

42 Provided by TSA in briefing to authors on December 14, 2006.

43 Clark Kent Ervin, Open Target, p. 98.

44 See Air Cargo Security Requirements; Final Rule, published in the Federal Register, May 26, 2006, available at http://a257.g.akamaitech.net/7/257/2422/01jan20061800/edocket.access.gpo.gov/2006/pdf/06-4800.pdf.

45 CRS Report to Congress, Air Cargo Security, Updated January 23, 2007, p. 13.

46 Diplomatic pouches cannot be opened under international law. Hazardous materials cannot be opened because to do so is to risk the integrity of containment.

47 The 9/11 Commission Report, p. 393.

48 The precise percentage of cargo inspected is considered Sensitive Security Information (SSI), but is less than half of all cargo placed on passenger flights.

49 TSA Overview Briefing to Authors, December 14, 2006.

50 See H.R. 1, Section 406, as approved by the House of Representatives of the 110th Congress, January 9, 2007. See also the Senate version, S. 4, which was approved on March 13, 2007. As of April 2007, resolution of the two bills was pending.

51 Section 110(a) stipulated that "(TSA) shall provide for the screening of all…cargo carried aboard a passenger aircraft operated by an air carrier or a foreign air carrier." The TSA general counsel's response was issued on August 1, 2001.

52 TSA sometimes uses the terms interchangeably. For example, in an internal summary of accomplishments for FY2006, TSA indicated that it "developed program to *screen* 100% of air cargo at smaller cargo-volume airports. TSA implemented an Operations Directive to *inspect* all cargo at Category II, III and IV airports." (emphasis added)

53 Public Law 107–71, November 19, 2001, Section 110.

54 Federal Register, Friday, May 26, 2006, §1544.205(b), p. 30510.

55 Unlike cargo in passenger flights which is loaded into the belly of the aircraft (which in certain aircraft can be at different temperatures and pressures than the passenger cabin), cargo on all-cargo aircraft is on the same level as the cockpit. Once the stowaway gets out of the cargo containment, he can reach the cockpit. See Congressional Research Service, CRS Report for Congress, Detection of Explosives on Airline Passengers: Recommendation of the 9/11 Commission and Related Issues, RS21920, Updated January 11, 2007, p. 3.

56 See Office of Management and Budget, Statement of Administration Policy, H.R.1—Implementing the 9/11 Commission Recommendations Act of 2007, January 9, 2007.

57 Specific requirements are outlined in Air Cargo Security Requirements, Final Rule, Federal Register, Friday, May 26, 2006, §1542–1544.

58 *Congressional Research Service Report for Congress*, Air Cargo Security, Updated January 26, 2006, p.10.

59 The ability of technology to detect explosives depends on size, shape, weight and density of the bomb. While the specifics are rightly treated as Classified or Sensitive Security Information, bombs do not have to be large. For example, the Pan Am 103 bomb weighed less than 16 ounces. See Clark Kent Ervin, Open Target, p. 99.

60 Assistant Secretary for TSA Kip Hawley, Aviation Daily Guest Blog, March 26, 2007, available at http://aviationweek.typepad.com/airports/2007/03/guest_blog_tsas.html.

61 Craig Whitlock, *Terrorists Proving Harder to Profile*, Washington Post, March 12, 2007, p. A1.

62 In the financial services sector, the Patriot Act requires banks and other institutions to monitor a wide range of financial transactions; yet financial services are booming. The Maritime Transportation Security Act placed new security requirements on port facilities and vessels. Despite strengthened passenger screening and baggage inspection mandates, the economic well-being of the aviation transportation sector has broadly improved since 9/11.

63 Turnover within the TSA airport security force is high enough that Congress approved funding for a screener force employee incentives program. However, some believe that a turnover rate of 25 percent is a significant improvement over the past, is reasonable, since pay is low and job stresses high, and in line with comparable industries.

Glossary

Air Carrier: An air carrier provides commercial air transport services for passengers and/or freight. Synonym: Airline.

All-Cargo Carriers: Companies (such as UPS and FedEx) dedicated solely to the transport of cargo. These companies are often called "integrated carriers" because they have aircraft designed to carry only cargo, and also fleets of trucks and vans. In addition, some all-cargo airlines are divisions or subsidiaries of passenger airlines, such as Lufthansa Cargo.

Built-up Cargo: Cargo that is palletized, shrink-wrapped, or otherwise packed in large shipping containers resulting in a dense unified mass. No reliable technology yet exists to inspect built-up cargo to the same standard as passenger baggage.

Air Cargo: Air cargo (broadly speaking) includes freight, express packages, and mail carried on passenger airliners and/or all-cargo aircraft. (In this study we do not consider mail which operates under a unique legal regime overseen by international postal authorities.)

Certified Shipper: Known shippers would become 'certified' by voluntarily submitting to TSA's more stringent security requirements, which are planned but yet to be implemented. Freight shipped by certified shippers would be subject to secondary and/or random inspection.

Explosive Detection System (EDS): Machines that automatically detect explosives in unopened baggage and cargo boxes. EDS are certified by TSA as having high rates of detection of the "types, amounts and configurations of explosives" that can bring down an airliner, while not exceeding a set rate of false positives. All the EDS certified to date employ X-ray computed tomography (CATSCAN) technology. Most EDS were designed to be integrated with baggage conveyors and operte at high speeds. Many, however, have been installed alone in airport lobbies, where bags are manually fed into them.

Explosive Trace Detector (ETD): Devices that detect and classify vapors and minute residues of explosives. Human operators collect samples, for example, by rubbing bags with swabs, which are then chemically analyzed in the ETD to identify any traces of explosives. ETD are considerably less expensive than ETD, but their operation is labor-intensive.

Freight Forwarder: An individual or company that acts on behalf of a shipper by dispatching or otherwise arranging space for shipments via waterborne vessels, airplanes, trucks or rail. Sometimes referred to as international freight forwarders, they have the expertise that allows them to prepare and process the documentation and perform related activities pertaining to international shipments. From a regulatory standpoint, they are often also Indirect Air Carriers (see below).

Hardened Unit Loading Device (HULD): A high-strength baggage or cargo container that safely contains an explosion that would otherwise destroy the airliner. HULDs have the same dimensions as ordinary ULDs, but weigh slightly more.

Indirect Air Carrier (IAC): Any person or entity within the United States not in possession of an FAA air carrier operating certificate that undertakes to engage indirectly in air transportation

of property and uses for all or any part of such transportation the services of a passenger air carrier. Usually but not always, IACs are freight forwarders; they are the entity that TSA certifies, inspects, and whose certificate TSA can revoke.

Known Shipper: A term used both in the United States and internationally, and also a formal part of TSA's security program. Becoming a known shipper is relatively easy—it means attaining a reputation as an established company in the shipping community, completing an application, being vetted by TSA against commercial databases and providing supporting documentation upon request by TSA, an airline, or an Indirect Air Carrier.

Screening: A process whereby cargo risk is assessed by an administrative profiling of shipping documents through existing databases according to a number of risk factors, such as who is shipping what, when, and how.

Third-Party Agent: An independent firm that audits air cargo security plans and operations either on behalf of the private sector or the government.

Unit Loading Device (ULD): Any non-hardened type of container used to carry cargo when loaded into the "belly" or "cargo hold" of an airliner.

Abbreviations

ATS—Automated Targeting System

CBP—Customs and Border Protection

CSI—Container Security Initiative

C-TPAT—Customs-Trade Partnership Against Terrorism

DHS—Department of Homeland Security

DOT—Department of Transportation

EDS—Explosives Detection System

ETD—Explosives Trace Detector

FAA—Federal Aviation Administration

FAS—Freight Assessment System

HULD—Hardened Unit Loading Device

IED—Improvised Explosive Device

IMO—International Maritime Organization

ISPS—International Ship and Port Facility Security Code

kV—A unit of potential equal to a thousand volts

MTSA—Maritime Transportation Security Act

NFO—Next Flight Out

TSA—Transportation Security Administration

TSL—Transportation Security Laboratory

ULD—Unit Loading Device

About the Authors

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Philip J. (P.J.) Crowley is a Senior Fellow and Director of Homeland Security at the Center for American Progress.

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Bruce R. Butterworth

Bruce Butterworth has had a distinguished government career in the Congress and the Executive Branch. Between 1975 and 1980, as a professional staff member for the House Government Operations Committee, he ran investigations and hearings on many transportation safety issues, particularly in aviation. He spent 11 years in the Department of Transportation, eight of them in the Office of the Secretary. He managed negotiations on the inclusion of air and maritime services in the GATT (now WTO), chaired US delegations to United Nations Committees, dealt with transport and aviation issues related to border inspections, and was part of the response to Pan Am 103.

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