

Airport Security

*Which Poses the Greater Threat—
Passengers or Air Cargo?*

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Which poses the greater threat to airport security—passengers or air cargo? This trick question assumes, first, an understanding of what security is; second, that airport security is a greater cause of concern than other kinds of security; and third, that the threat issuing from passengers and air cargo is stable. The question implicitly assumes that other entities are not a threat or not as threatening as passengers and air cargo, and that the threat must and should be avoided or minimized.

Examining these assumptions can clarify thinking about airport security from the perspectives of security professionals, security consumers, and purchasers or endorsers of security for the various modes of transportation. Although other security issues will be raised, terrorism is the focus.

Follow the Meanings

Sometimes airport security refers to a state of mind, a subjective state—that someone feels safe from intentional harm.¹ The actual situation at an airport—for example, the numbers of terrorist passen-

¹ See Bloom, R. W. Fear of Flying: Globalization, Security, and Terrorism. *TR News*, July–August 2010, pp. 21–27.

gers, the types of bomb-laden cargo, the accuracy rates of the explosive detection systems, the type and duration of the training received by the behavioral detection personnel, and the functionality of a motion detector supporting perimeter security—may elicit different degrees of feeling safe from intentional harm at different times. The degree of feeling safe may have less to do with the actual situation at an airport than with personal, social, and professional aspects of one's life.

Airport security also may refer to an objective consequence—that someone is safe from intentional harm. Yet airport security personnel may not know this for certain, nor will terrorists or other criminals know how unsafe the airport is. As a result, deciding how much money to appropriate and allocate for airport security is difficult. Terrorists share a related problem: how much money and what expenditures will yield the greatest effect—for example, an attack via passengers, air cargo, both, or some other means?

A third meaning of airport security encompasses what is done to achieve the first two meanings—feelings of security and objective security. This includes measures such as behavioral detection,

PHOTO: WERNER HENNIES,
MUNICH AIRPORT



A FedEx jet is loaded with cargo. Cargo security measures include explosives detection systems, known-shipper programs, and canine inspection.

The psychological effects of acts of terrorism—along with the more outwardly visible physical impacts—factor into any discussion of air security.

recognition, interviews, and interrogation; explosives detection systems; biometrics; profiling and data mining algorithms; known-shipper programs; and the older standbys of fences, locks, identifications, canine sniffers, package inspection, and cops walking the beat.

These three meanings of airport security provoke arguments and dysfunctional crosstalk among security experts confronted with operational challenges, policy issues, and budget recommendations. Answering the question of whether an airport has adequate security—and whether passengers or air cargo pose a greater threat—depends on security experts', terrorists', and the traveling public's perceptions of the

three kinds of security and their vulnerabilities, their own perceptions, and their perceptions of the perceptions of the others. Ultimately, the question is which vulnerabilities, if successfully exploited, could achieve terrorist goals.

Security Worries

Worrying about airport security is helpful if the result is useful knowledge and action. But how much of airport security should be worried about? Some approaches to fix airport security could spend the entire U.S. federal budget but not reach perfection. Even if airport security were fixed, terrorists and other security violators could exploit a theoretically infinite number of other possible locations and situations that have vulnerabilities.

Examining the threats from passengers and air cargo and making recommendations to minimize the threats reveal the constraints of economic prudence and operational prudence. Terrorists who have adequate capabilities for intelligence, surveillance, and reconnaissance are aware of these constraints. The threat from passengers and air cargo will vary accordingly.

The Nature of Threat

Threat also may be defined as what may go wrong from passengers and air cargo, what will go wrong, and what is planned to go wrong through the means of passengers and air cargo—that is, an intentional threat from terrorists. Adding to the complexity is that a terrorist threat is both physical and psychological.

The psychological aspect involves the way that people cognitively, emotionally, motivationally, and behaviorally react to the physical, especially people whose reactions directly or indirectly may help achieve the political, religious, social, cultural, or other goals of terrorist planners and perpetrators. The meanings of a threat change according to the vulnerabilities of what is being attacked, as well as the probability and impact of a successful attack.

The comparison of threats from passengers versus air cargo, therefore, cannot yield a generic answer. Instead, the answer varies with interacting changes, including those in layers of security known and unknown to terrorists; social, cultural, economic, political, and environmental trends affecting terrorists and the world; and terrorist means, support, and motivations.

Comparing Sources of Threat

Even if accurate quantitative and qualitative analyses of the comparative threat from passengers and air cargo were possible, drawing a dichotomy between the two may itself pose a threat. Besides passengers,



PHOTO: JACINTA QUESADA, FEMA

human threats to airport security may come from airport workers, airline personnel, and the general public—including terrorists, terrorist supporters, and those who unknowingly become objects in terrorist plans and attacks—all with access to minimally screened areas and areas adjacent or proximal to the airport. Besides air cargo, inanimate threats to airport security may include commercial merchandise for sale, carry-on and checked baggage, weapons in minimally screened areas and areas adjacent or proximal to the airport, and exploitable natural disasters.

More appropriate and comprehensive, therefore, would be a comparative analysis of threat from people versus things—including terrorists and other criminal insiders, parking lot bombs, nonpassenger shooters in or adjacent to the terminal, portable air-defense systems proximal to the airport, and the biomedical threat from various populations. Again, terrorists' perceptions of security layers, larger trends, means, support, and motivations will affect the degree of threat—and this will change with time.

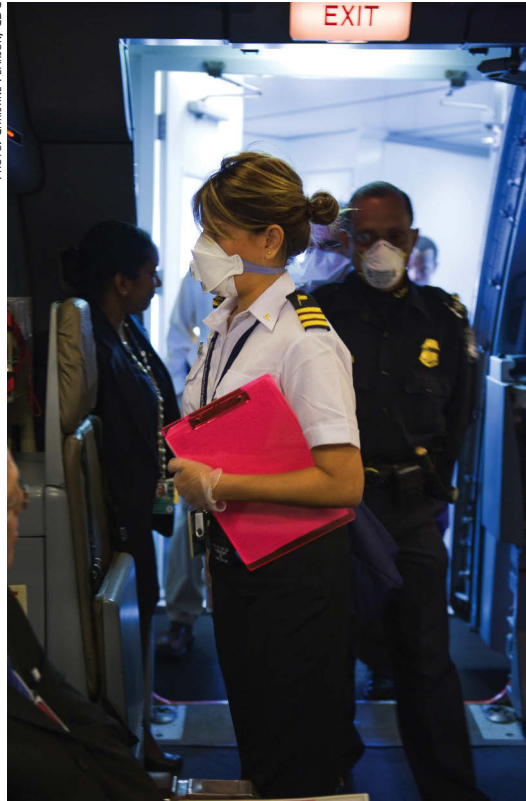
The main issues in identifying objective and intentional threat from passengers and air cargo in the context of terrorism involve the vulnerabilities that can be exploited by terrorists and that contribute to their choice of passengers and air cargo in attacks. Vulnerabilities known by terrorists in threat identification affect threat from passengers, air cargo, and any other means. Vulnerabilities in threat identification overlap with and contribute to basic target vulnerabilities—that is, what can go wrong, the probability that it will go wrong, and the impact on achieving terrorist goals.

Identifying Threat from Passengers

Identifying threat from passengers involves collecting and analyzing biological, psychological, and social information and developing a valid link to the probability of direct or indirect engagement in—or support of—terrorism. This applies to techniques such as data mining to collect and analyze travel history; biometrics, including facial recognition; human- and technology-mediated surveillance of mobility and location within the airport; behavioral detection and interviewing; or remote sensing of physiological activity. These techniques use the past and the present in an attempt to predict the future.

Predictions of human behavior, especially socially meaningful behavior, however, often are found wanting. More than 130 years of scientific psychological research suggest that the prediction of human social behavior is unknowable, even when the best practices of inferential statistical theories and the putative capabilities of human intuition, insight, and intelligence are applied.

PHOTO: CHRISTINE PEARSON, CDC



At an October 2008 preparedness exercise for various federal agencies, Centers for Disease Control and Prevention quarantine officer Danitza Tomianovic assesses the status of an ill traveler at the Miami International Airport. Threats from air passengers include the spread of disease.

Mass passenger screening poses 12 main difficulties:

1. The same data—the so-called signs, stigma, or indicators—may have different meanings at different times, in different situations, even with the same passenger, let alone different passengers.
2. The motivations of passengers may vary significantly within small temporal interludes, as may the links between motivations and specific behaviors.
3. How well can other people be known, if they themselves have less than complete conscious access to all motivations, which may vary?
4. Sophisticated passengers who intend terrorism will choose not to look like terrorists as described in watch lists and profiles, but like passengers who do not intend terrorist acts.
5. Most passengers are extremely unlikely to engage in terrorism; therefore a system to find terrorists must have extremely high sensitivity rates to identify terrorists, as well as extremely high specificity rates to avoid misidentifying nonterrorists as terrorists. Without high rates in sensitivity and specificity, operational chaos and a potential shutdown of commercial aviation would be likely.
6. Screening systems without high specificity rates may lead certain nonterrorist passengers to become terrorists because of perceived mistreatment.
7. Some terrorist passengers inevitably will be



Photo: Gerald Nino, CBP

A member of the U.S. Customs and Border Protection Beagle Brigade investigates a passenger's luggage for prohibited agricultural products. Dogs often are used as part of airports' security screening measures.

treated as nonterrorists—if the screening system lacks sufficiently high sensitivity—with successful terrorism as the result. Because of Points 4 through 7, random or modified random screening of passengers may be optimal, even including the proverbial 4-year-old child and the 90-year-old grandmother.

8. A common terrorist indicator, stress, is problematic. Passengers may be stressed for many non-terrorist reasons, such as trying to catch a flight, but may be calm about intentions to engage in terrorism in the service of God or to become a star through global news headlines.

9. The typical explanations for passenger terrorism, such as grievances and ideology, may only be the tip of the psychological iceberg. Security experts may be looking at what makes terrorist sense to the security expert, not to the terrorist.

10. All commonly accepted approaches to the prediction of terrorism have serious epistemological problems. Knowledge and logic both are affected by emotion and the unconscious, for good and for bad.

11. Research in psychology and philosophy suggests that the quest for valid mass screening of passenger terrorists based on appropriate mathematical procedures and linguistic concepts may be a waste of resources.

12. The sparse data available suggest that stand-off crowd observations at best have minimal effect without time- and labor-intensive techniques including actual discourse between security personnel and each passenger identified for additional attention.

Vulnerabilities in Baggage Screening

In identifying the threat from passengers, the screening of carry-on and checked baggage, as well as clothing, possessions, and bodies, employs techniques

that also are useful in screening air cargo. Although human security specialists may screen all of the above, as appropriate, with their eyes and hands, and dogs may screen with their sense of smell, more attention has centered on screening via technologies. This focus stems from the presumption that humans and dogs may take too long, may cost too much, may be disruptive to airport and aviation operations, and may be less accurate. These presumptions, however, are not always correct.

Technology-mediated screening is geared to identify physical characteristics of explosives, weaponry, and weapon components intended for terrorism. Bulk forms and trace amounts of proscribed materiel can be identified, with the immediate ascription of terrorist intent to the individual accountable. Technology-mediated screening usually analyzes an object's physical properties based on computerized algorithms. Differential densities of an object interacting with radiation, and explosives- and weapons-related particles interacting with chemical sensors, are the most common phenomena supporting detection.

Technology Problems

All technologies have problems, however. First, they are not 100 percent accurate in sensitivity and specificity and become less accurate in progressing from the experimental laboratory through field tests to operational deployment. Accuracy decreases further with human performance factors such as low motivation, fatigue, distractions, information anomalies, and dysfunctional heuristics.

Second, terrorist passengers supported by intelligence, reconnaissance, and surveillance capabilities may beat the system, work around it, or target another aspect of the airport or aviation, another transportation modality, or another venue. To counter this, security authorities may miscommunicate purposely about technologies or prepare altered technologies to fall into the hands of terrorists.

A third problem is that the costs are prohibitive. To field technologies at all airports and then to add the costs of installation, operations and maintenance, training, and the possibility of necessary structural and operational modifications to the airport can break a budget without preventing airport terrorism.

Opportunity cost also is involved, because the threat of passenger terrorism can weaken targets economically with few, if any, successful attacks. The increased security expenditure and overhead reinforces the perceived threat of attack and itself constitutes an attack.

Another cost involves the collateral economic damage of less efficient and enjoyable air travel for

recreation and business. The online and virtual worlds compete with aviation for revenue, often at lower cost, for entertainment and for work.

In addition, some technologies offend cultural sensibilities—for example, the wounding of a body or the opening of a coffin in transit. Cultural offense can increase motivations for terrorism in some passengers and can decrease the optimal performance of security personnel.

Some technologies also may pose health issues if the cumulative effects of screenings or possibly malfunctioning equipment generate higher exposure to radiation or chemicals—although the data to support these effects are not sufficient. These phenomena may present a significant threat, however, to the integrity of the contents of air cargo, along with associated damage to economic viability and trade.

The physics and chemistry of security technology may be poorly understood by security personnel, leading to misuse. A widespread belief in the magic of the technology supporting detection systems has hindered some security efforts. Terrorists intent on using passengers and air cargo in an attack can exploit the tensions between protecting proprietary information, the need for comprehensive vetting of a security process, and advocacy for relatively transparent methods in a representative democracy.

Air Cargo Threat

Passengers can be directly queried and physically appraised, but for air cargo only the people involved in the various processes from the creation of cargo through the many phases in the chain of custody can be queried. Much less attention and fewer resources have been addressed to the threat of air cargo than to the passenger threat. Many citizens and legal authorities seem to have less concern about aircraft carrying only cargo and a crew than about commercial passenger flights with cargo.

That air cargo containing explosive materiel or other noxious agents, whether on commercial passenger aircraft or on flights without commercial passengers, can endanger large numbers of people seems to be ignored, discounted, or repressed. Depending on the type of attack, the consequences could include large numbers of human casualties; a small number of casualties with high symbolic value; and symbolic, significant, and even catastrophic damage and destruction to communications, energy, and other infrastructure of national and international significance.

Identifying the objective and intentional threat from air cargo has vulnerabilities. The threat stems from the intentions of the planners of an attack, their perception of the vulnerabilities, and vulnerabilities of the target.

Cargo Screening Vulnerabilities

Air cargo varies in content, how the content is packaged and situated, and the configuration and other characteristics of the aircraft.

Content may be categorized by density, weight, size, economic value, and signatures of explosives, weapons, and weapons components. The associated screening challenges include (a) possible electrostatic discharge; (b) physical damage related to the method of screening; (c) levels of specificity and sensitivity related to the cargo content; and (d) terrorist knowledge of screening methods, which can lead to the development of countermeasures or to other means of exploitation.

Packaging is categorized by density, weight, size, and whether it is infiltrated with explosives or weapons materiel. Additional categories in the context of security include break bulk—individually loaded and unloaded items; palletized—items organized together on flat racks with netting, tensioned straps, and semistructural covers; and containerized—sealed receptacles categorized by height, width, depth, base, and maximum load. Packaging also is associated with combinations of tapes, locks, seals, tracking technologies, and sequenced methods for opening and closing, which pose strengths as well as vulnerabilities.

Important characteristics of aircraft configuration include the size, placement, thickness, and density of doors; the placement and dimensions of decks; the

Fewer resources have been devoted to the issue of air cargo security. Cargo containing explosives or other harmful materials can endanger many people.



PHOTO: WIKIMEDIA COMMONS

placement, dimensions, and number of holding compartments; and positions and procedures for situating cargo. Also of note are operating conditions; performance characteristics; structural and dynamic features; taxi, takeoff, and landing weights; fuel tanks; and engine, wheelbase, and fuselage characteristics. Any of these could be exploited as part of a terrorist attack.

Each of the main security approaches offers vulnerabilities—trace explosive detection; bulk explosive detection; canine explosive detection; detection devices for weapons and weapons components; education, training, and assessment for human operators of technology and for eye- and hand-mediated searches; and hardening of the packaging to mitigate an explosive threat from the contents.

Supply Chain Vulnerabilities

Many entities are involved in the air cargo supply chain, creating a significant vulnerability. A generic list of supply chain entities resembles the complexity of the final stanza of “The Twelve Days of Christmas”: manufacturers, manufacturing facilities, freight forwarding facilities, shipping facilities, third-party logistics providers, warehouses, other distribution centers, independent cargo screening facilities, and more—the average number of entities handling a shipping container worldwide is 18, according to some experts.

The so-called known-shipper programs do not address the security of all involved in a shipment, and certified cargo prescreening programs do not address the security of the items shipped. The various screening methods chosen by government and business have significant error rates. Both the known-shipper and certified cargo prescreening programs incorporate vulnerability in the chain of custody, and both are exploitable by terrorists and other criminals, even with government-mandated inspections.

Security Conundrum

The physical and supply chain issues together create a conundrum. On one hand, implementing total and intrusive screening—which has dubious validity—could lead to significant cost in global economic viability, regardless of a successful terrorist attack; some opine that this economic damage constitutes the terrorist attack. On the other hand, partial and less comprehensive screening—also of dubious validity—could be more open to the economic catastrophe of a successful terrorist attack, but less open to global economic damage.

Of course, any correctly chosen and successfully implemented terrorist attack will cause global economic damage. These conclusions are not intended

to damn security personnel and decision makers, but to underline the challenges they face.

Changing with Changes

The security threat from passengers or air cargo changes from moment to moment, depending on risk—the continuous coupling of threat with vulnerability, qualified by the impact and probability of a successful terrorist attack. The comparative analysis of the threat from passengers and air cargo raises five issues:

1. How effective are basic military, paramilitary, law enforcement, and intelligence operations to neutralize an attack before terrorists get anywhere near an airport? Information and intelligence need to be continuously and securely transmitted to aviation-related authorities to modify policies, plans, programs, and layers of security, moment by moment. The result can change the threat from passengers and air cargo, but also the planning preferences of terrorists—and can raise other fears.

2. Organizational psychology and human resource management—which involve morale, work culture, education and training, and personalities—can affect vulnerabilities in identifying the threat from passengers and air cargo. Organizational cultures can shape the perceptions of threat: the feelings of threat, the associated objective threat, and indirectly, the intentional threat from terrorists.

3. Foreign policy tools—diplomatic, economic, social, cultural, and humanitarian—should be used to shape international perceptions of the United States so that fewer people wish to engage in or support terrorism.

4. Too many people in the United States expect total safety and security—an unreasonable mass psychology that has not been addressed adequately by political and security leaders. Applying counterterrorism resources in ways that do not correspond to objective and intentional threat can render the United States an ever more lucrative terrorist target and can increase the probability of terrorist success—because objective success and objective failure both qualify as subjective success.

5. Terrorism ultimately is psychological. For example, public discourse and classified analysis of the comparative threat from passengers and air cargo are themselves part of the psychological battlefield, involving time, money, and attention working for and against terrorist goals.

In conclusion, the comparative threats from passengers and from air cargo will change as the world changes. As noted by many philosophers, we are of the world and in the world, part of the problem and part of the solution.