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# Air Travel Security Since 9/11

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*K. Jack Riley*

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# Air Travel Security Since 9/11<sup>1</sup>

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K. Jack Riley

The phrase “touch my junk” became part of the lexicon of air transportation security in 2010 thanks to the Transportation Security Administration’s (TSA’s) controversial decision to increase physical scrutiny of travelers. John Tyner, attempting to travel from San Diego on a hunting trip, uttered the now-famous words when he refused to go through a whole-body image (WBI) scan and subsequently refused to submit to a full-body frisk in late 2010. The latter would have involved a TSA agent touching his “junk,” or genitals. Passengers selected for and unwilling or unable to complete a whole-body electronic scan are subject to an intensified pat down involving a government or contractor employee touching their body.

Although many travelers do not object to the use of these two measures as the primary screening methods, many others do. The machines do not detect explosives but rather use x-rays or millimeter waves to generate an image of the passenger’s body. Denser objects, such as metal, multiple folds of clothing, medical devices, and diapers show up as darker areas (called *anomalies*) on the image. There is debate as to whether the machines, had they been in use, would have identified as an anomaly the explosive material that Christmas bomber Umar Farouk Abdulmutallab concealed in his underwear.<sup>2</sup> Others have raised health concerns about the machines, particularly the backscatter scanners (which generate their images from x-rays).<sup>3</sup> Some travelers object to the speed of the WBI scans, as they are demonstrably slower than the previous methods. Still others object that travelers with certain types of medical equipment (including wheel chairs) or medical conditions (such as those requiring use of portable oxygen) are ineligible for such scans and instead must be patted down. At many airports, WBI

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<sup>1</sup> I am indebted to many individuals who contributed ideas to this essay, including Bob Poole of the Reason Foundation and the many vocal and informed participants found on Flyertalk’s Travel Safety and Security forum. I am also grateful to the many anonymous travelers who have given their opinions about airport security issues in lines and lounges and on planes all over the world. Although these contributions have undoubtedly improved this essay, the contributors in no way bear responsibility for any errors or omissions.

<sup>2</sup> Steve Lord, *Testimony Before the Subcommittee on Transportation Security and Infrastructure Protection, Committee on Homeland Security, House of Representatives: Aviation Security—TSA Is Increasing Procurement and Deployment of the Advanced Imaging Technology, but Challenges to This Effort and Other Areas of Aviation Security Remain*, Washington, D.C.: United States Government Accountability Office, GAO-10-484T, March 17, 2010.

<sup>3</sup> In April 2010, four researchers from the Department of Biochemistry and Biophysics at the University of California, San Francisco, made their concerns public in a “letter of concern” to the Assistant to the President for Science and Technology (John Sedat, David Agard, Marc Shuman, and Robert Stoud, “Letter of Concern,” letter to Dr. John P. Holdren, Assistant to the President for Science and Technology, San Francisco, Calif., April 6, 2010). Health concerns are magnified by the lack of transparency in the maintenance schedule. Indeed, a few days after this speech was given, TSA reported that a review of maintenance records (prompted by press requests and congressional demands) showed that TSA had made calculation errors in its safety studies of the backscatter machines and that true radiation levels were ten times higher than expected on some machines (Alison Young and Blake Morrison, “TSA to Retest Airport Body Scanners for Radiation,” *USA Today*, March 14, 2011).

machines are configured in a way that creates a personal security problem because travelers standing in the WBI cannot watch their personal goods go through the x-ray machine. This creates a risk of theft as goods exit the x-ray machines.<sup>4</sup> Others object that the machines frequently generate false alarms (from folded clothing, pleats, etc.) that must be resolved with a pat down. Finally, many of course object, usually on Fourth Amendment or privacy grounds, to the fact that the WBI scans generate detailed images of the traveler's body that are viewed, and perhaps stored, by government or contractor employees.<sup>5</sup> Some object to pat downs on the basis of similar concerns and because pat downs require the TSA agent to make intimate contact with the traveler through clothing.

Very recently, TSA has begun testing software modifications that obscure or eliminate the body images while still showing anomalies. Although these methods address some privacy concerns, they do not alleviate concerns related to the Fourth Amendment, health, effectiveness, speed, personal security, and false alarms.

As more of these machines are deployed and the costs associated with these new methods mount—an estimated \$1.2 billion per year in capital equipment in operating costs by 2014<sup>6</sup>—it is appropriate to take a step back and ask three questions: How has passenger security performed since 9/11? What opportunities and innovations have we missed or not pursued? And what next steps should we be considering?

## Air Travel Is Safe and Secure

I begin from the premise that air travel is safe and secure. In the ten years since the terrorist attacks of 9/11, approximately 6 billion enplanements (i.e., instances of passengers boarding a plane) have occurred in the United States, and perhaps an additional 14 billion have occurred worldwide. Between 2001 and 2009, 7,019 people died worldwide in hull-loss aviation accidents (a figure that excludes corporate and military incidents).<sup>7</sup> In addition, approximately 200 died on airplanes or at airports as a result of terrorism since 9/11, including two people who were killed in 2002 during Hesham Mohamed Hadayet's attack at the El Al counter at Los

<sup>4</sup> This is particularly a problem with the backscatter machines. They have solid, nontransparent walls. The millimeter wave machines have clear walls that aid the ability to track personal items. Still, the machines are sometimes configured in a way that prevents passengers from maintaining constant visual contact with their goods.

<sup>5</sup> It is unclear whether the machines can store images. Specifications in the procurement documents seem to require the machines to be able to store images, but TSA reports that they can only store images when the machine is in "test" mode (Gale D. Rossides, letter to The Honorable Bennie G. Thompson, Chairman, Committee on Homeland Security, U.S. House of Representatives, Arlington, Va., February 24, 2010). In August 2010, the U.S. Marshals Service (part of the Justice Department) acknowledged that more than 30,000 images were stored on a machine used at a courthouse in Orlando (William E. Bordley, "Re: Freedom of Information/Privacy Act Request No. 2009USMS13697; Subject: Images," letter to John Verdi, Esq., Electronic Privacy Information Center, August 2, 2010). The Electronic Privacy Information Center filed a declaration against the Department of Homeland Security (DHS) in the U.S. District Court for the District of Columbia on May 27, 2010, that, among other requests, sought to compel DHS (TSA) to produce 2,000 images stored for training purposes. This request was blocked on January 12, 2011, on the grounds that it would reveal vulnerabilities of the body-scanning technology.

<sup>6</sup> Mark G. Stewart and John Mueller, "Risk and Cost-Benefit Analysis of Advanced Imaging Technology Full Body Scanners for Airline Passenger Security Screening," University of New Castle, Research Report No. 280.11.2010, January 2011.

<sup>7</sup> See Aviation Safety Network, "Statistics," web page, last updated January 10, 2005.

Angeles International Airport.<sup>8</sup> Since 9/11, far more people have died as a result of safety incidents than security incidents. In short, despite the tragedy and loss of life on 9/11, air travel is overwhelmingly a secure means of transportation, especially in the United States.

There are at least three factors that contribute substantially to the improved security of air travel.<sup>9</sup> First, and perhaps most importantly, passengers now know that they have to be vigilant. The lessons of 9/11 were learned within minutes of the first attack, as evidenced by the fact that passengers and crew on Flight 93 realized the attackers' suicide mission and fought to regain control of the plane.<sup>10</sup> Since then, there have been a number of additional incidents that passengers and crew have helped disrupt, including the attempted attacks by Richard Reid (the "shoe bomber") in 2001 on an American Airlines flight and by Abdulmutallab (variously referred to as the Christmas, Detroit, or underwear bomber) in 2009 on a Northwest flight. In both cases, passengers and crew intervened to help thwart the attacks.

Second, airlines have reinforced cockpit doors and modified operational procedures to strongly limit access to the cockpit. Regardless of the method used, these steps mean that it is much more difficult, although not impossible, to commandeer an airplane and conduct an attack similar to that launched on 9/11.

Finally, changes to the visa process represent a relatively unheralded but important contribution to passenger security. All 19 of the terrorists involved in the 9/11 attacks were in the United States on legitimate visas.<sup>11</sup> Since the attacks, significant changes to the visa process have been enacted. Currently, under the Visa Waiver Program (VWP), residents of 36 countries can travel to the United States with only a passport.<sup>12</sup> Those traveling from non-VWP nations, including such countries as Pakistan, Saudi Arabia, and Yemen, are required to obtain a visa. Obtaining a visa requires the traveler to provide extensive documentation about himself or herself (and, in some cases, family members, business associates, and the sponsor), and this information is investigated using homeland security, intelligence, and law enforcement databases. Applicants also undergo an in-person consular interview. Finally, given the increased cooperation among law enforcement and intelligence agencies, there is an increased likelihood that adverse information about a visa-seeker will come to light. Indeed, in the case of Abdulmutallab, there appeared to be sufficient information, some of it provided to intelligence officials by his father, to warrant revoking his visa or placing him on the no-fly list.<sup>13</sup>

Despite the strong contributions these three factors make to air transportation security, the vast majority of U.S. transportation security resources are spent at the airport in an effort

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<sup>8</sup> National Consortium for the Study of Terrorism and Responses to Terrorism, Global Terrorism Database home page, undated.

<sup>9</sup> Another augmentation of security has probably crept in, albeit inadvertently. An increasing fraction of domestic enplanements comprises small regional jets that are incapable of causing the kind of damage that occurred with the larger planes hijacked on 9/11.

<sup>10</sup> See, for example, Susan Sward, "The Voice of the Survivors: Flight 93, Fight to Hear Tape Transformed Her Life," *San Francisco Chronicle*, April 21, 2002. See also *The 9/11 Commission Report: Final Report of the National Commission on Terrorist Attacks upon the United States*, New York: Norton, 2004, pp. 10–14.

<sup>11</sup> *The 9/11 Commission Report: Final Report of the National Commission on Terrorist Attacks upon the United States*, New York: Norton, 2004.

<sup>12</sup> U.S. Department of State, "Visa Waiver Program (VWP)," web page, undated.

<sup>13</sup> Robert Winnet, Duncan Gardham, and Toby Harnden, "MI5 Told US About Detroit Bomber's Terror Links 'a Year Ago,'" *The Telegraph*, January 4, 2010.

to prevent passengers from bringing potentially dangerous and therefore prohibited goods on board. The primary concern is explosives. TSA spends more than \$5 billion annually on a workforce numbering an estimated 60,000. These screeners man the walk-through metal detectors, operate the baggage x-ray systems, run the WBI devices, conduct pat downs, implement behavioral profiling, and manage other functions that we have all experienced at an airport. Of course, one reason the workforce and the expenses are so large is that the screening functions are performed virtually uniformly on every traveler entering an airport in the United States.

## Missed Opportunities

The high level of suspicion, and therefore scrutiny, with which American passengers are treated is a curious departure from other dimensions of transportation and border security, where risk-based approaches tend to be more common. For example, we do not scan or search every container of cargo that enters the United States. To do so would not only be impractical but also very costly. Instead, we rely on a variety of mechanisms, including trusted shipper programs, random inspections, and a variety of other tools, to screen higher-risk cargo. With cargo, the aim is to inspect a significant fraction of the cargo deemed high risk and to supplement these inspections with more-judicious and random inspections of other cargo.

Another departure from the “inspect everyone and everything” approach can be found in the case of TSA’s own workforce. At many airports, TSA employees are screened neither the first time nor subsequent times that they enter the secure area of an airport, in part because they are trusted employees who have undergone a background check. Because of the background check, they are thought to be at particularly low risk of the kind of coercion or conversion to radicalism to which passengers are thought to be vulnerable.

The disparate treatment of cargo and TSA employees on one hand and passengers on the other constitutes the main missed opportunity since the terrorist attacks of ten years ago. In the intervening ten years, we have failed to implement any kind of risk-management system that would allow TSA to focus its screening resources more judiciously. There are two main elements to a passenger-based risk management system. The first is that flights originating in the United States are at much lower risk of being attacked by terrorists than flights originating overseas. The second is that we know enough about many passengers, whether it is their occupation, the security clearances they hold, or their traveling profile, to trust them to a greater degree than the current system does.

There is very little reason to be concerned about suicide bombers being present on flights originating in the United States. To be sure, several radicals have planned and attempted attacks on land in the United States, including Faisal Shahzad, the would-be May 2010 Times Square bomber. To date, however, none of the attempted attacks originating in the United States since 9/11 has involved a suicide bomber. Moreover, all of the attacks have involved large, crude bomb assemblies and have been aimed at targets that are softer than air travel and are difficult to protect. Nonmetallic bombs have been available as an attack method far longer than WBI and frisks, which were introduced in late 2010, have been used as a security measure in the United States. The complete absence of such attacks originating on U.S. soil, even before the security measures were adopted, is clear testimony to the low risk among the domestic population.

Thus, a simple initial fix is to ensure that travelers beyond the border who desire to come to the United States are subjected to a higher level of scrutiny than travelers already in the United States. This could be accomplished by maintaining current levels of inspection of travelers coming to the United States and reducing the use of advanced equipment and intrusive methods in the United States, where the threat is lower. Such a step would generate significant equipment and staffing savings by reducing the number of machines and personnel required at American airports. As a practical matter, the low risk surrounding domestic enplanements means that the previous system of baggage x-rays and the uniform application of walkthrough metal detectors was sufficient.

As a side note, it is worth questioning whether enhanced methods (i.e., WBI and frisking) need to be used on every international traveler coming to the United States. An argument can be made that pre-Abdulmutallab measures should have caught Abdulmutallab and therefore that the enhanced methods could be used as a limited supplement. It bears noting that Abdulmutallab's pentaerythritol tetranitrate (PETN)-type explosive (and many other nonmetallic kinds of explosives) can be detected through means other than the WBI machines, including swabs that can be wiped on passengers and their luggage and then rapidly analyzed for explosive traces.<sup>14</sup> It can also be argued that, although routine methods are sufficient for most international travelers, Abdulmutallab presented a sufficiently suspicious profile that he should have been subjected to extra scrutiny of the type now being implemented for all travelers, domestic and international.

There is another dimension to this missed opportunity: the failure to develop a trusted traveler program. Our current security regime is scaled to apply the same procedures to each of the approximately 700 million passengers that get on planes each year in the United States.<sup>15</sup> That we have not developed a reasonable way to reduce that inspection workload is perhaps the biggest missed opportunity of the last decade.

There are a variety of ways in which we could configure a trusted traveler program. No program will be bulletproof, but, frankly, it does not need to be, given the extremely low odds of a suicide terrorist being on a flight originating in the United States. The characteristics, or combinations of characteristics, around which a trusted traveler program could be organized include

- Possession of a security clearance issued by a U.S. government agency. Most U.S. government security clearances are issued after a comprehensive background investigation that includes an examination of foreign ties. These clearances, which are far more stringent than the criminal background checks conducted on TSA agents, permit the holders to work on the government's most pressing and sensitive problems. *The Washington Post* reported in 2010 that more than 850,000 people held top secret clearances, a credential that requires an investigation covering the preceding ten years that includes contact with employers, coworkers, and others; investigation of education, professional, personal, and

<sup>14</sup> Committee on the Review of Existing and Potential Standoff Explosives Detection Techniques, National Research Council, *Existing and Potential Standoff Explosives Detection Techniques*, Washington, D.C.: National Academies Press, 2004.

<sup>15</sup> U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, *Transportation Statistics Annual Report 2009*, Washington, D.C., 2009, p. 122, Table 2-2-5: Domestic Enplanements at U.S. Airports: 1999–2009.

civic affiliations; and agency checks of spouses and significant others.<sup>16</sup> Hundreds of thousands hold lesser clearances that require similar, although not as stringent, investigations.

- A profile that involves frequent travel. An individual traveling 100,000 miles per year is, by conservative estimates, spending 200 hours on airplanes each year. That is approximately 10 percent of a standard 2,000-hour work year. This, combined again with the extremely low likelihood of terrorists or suicide bombers being on flights originating in the United States, suggests that such travelers can be screened via the basic procedures that were in existence prior to the deployment of WBI machines and pat downs. Airlines generally do not make information on the size of their frequent-flyer pools publicly available, but such individuals are thought to number in the tens of thousands to the hundreds of thousands. Even at the lower end of the range, they would still be responsible for a significant fraction of the annual enplanements in the United States.
- Travelers willing to submit to the equivalent of a security clearance process. Some business and leisure travelers would consider it well worth the time and expense to obtain such a credential in exchange for the ability to get through an airport more quickly. Several programs, including Global Entry, NEXUS, and SENTRI, already allow travelers to become pre-approved for expedited clearance for entry into the United States at borders. Global Entry members, for example, pay a fee, undergo an interview and background check, and provide fingerprints as part of seeking approval. Again, numbers are generally not easily available, but the combined programs likely cover hundreds of thousands of frequent travelers.

It is important to note that I am not advocating that travelers with these characteristics be exempt from security screening. Rather, they should be eligible for a level of primary screening that is not as intrusive and time consuming as WBIs and frisks. These trusted traveler screenings would be supplemented by random applications of more-intensive secondary screening on small portions of this population. The random secondary screenings would help prevent contraband and risk from creeping in through the process. In the meantime, the more-intensive methods can be more effectively used on people about whom we know little. In addition to allowing resources to be more effectively used, we would also likely significantly reduce the number of machines, and therefore people, needed for security procedures at airports, thereby reducing the expense of operating the system.

Estimating the potential savings associated with these changes is difficult, in part because the two approaches can overlap, depending on how they are implemented. For flights originating in the United States, returning to the procedures that existed before the recent additions would save, at a minimum, on the order of \$1 billion. These savings would arise from having to procure far fewer of the scanners and the need for correspondingly fewer staff to man them. Stronger recognition of the security of flights originating in the United States could achieve additional savings by eliminating existing measures, such as supplemental searches of passengers at the gate as they board planes and the use of roving teams to test passengers' beverages for explosive residue in the secure parts of an airport.

The savings from a trusted traveler program would depend significantly on how it was configured, who would pay, and, to a great degree, on what fraction of the travel base qualified for the program. Had these steps been implemented in the years after 9/11, the savings would

<sup>16</sup> Dana Priest and William M. Arkin, "A Hidden World, Growing Beyond Control," *Washington Post*, July 19, 2010.

now likely total in the tens of billions of dollars, with no discernable reduction in security. Savings to travelers in the form of shorter lines, reduced stress, and quicker transit through security would be enormous.

## The Decade Ahead

These new security procedures have real, if uncalculated (and perhaps incalculable), costs. The new screening methods, which are observably slower than the methods they replaced, impose additional losses on travelers who could more productively use their time, whether on leisure or business, than moving through airport security. In addition, the new security measures seem likely to deter some people from traveling at all and to push others into different modes of transportation. In the case of the former type, the result is additional losses imposed on the economy. In the case of the latter type, air travelers who are choosing to drive instead of fly are being exposed to greater risk. Researchers estimated that the 9/11 attacks generated nearly 2,200 additional traffic deaths through mid-2003 due to the relative increase in driving and the reduction in flying resulting from both the fear of additional attacks and from associated reductions in the convenience of flying.<sup>17</sup> That is, in this two-year period, the shift to driving caused more than ten times as many deaths as the cumulative total of deaths due to terrorist attacks on aviation since 9/11.

Recognizing the inherent security of flights originating in the United States and creating a trusted traveler program are two relatively short-term steps that can be taken. What other changes should we be looking at for the longer term? One is evident.

TSA should be required to analyze proposed security measures and regulations using clear, transparent risk-management principles. One reason that we have ended up in the current situation is that security measures are grafted or layered on in response to specific incidents, with little regard to an integrated assessment of cost, effectiveness, and impact on risk. Yet risk management modeling can be used to gauge counterterrorism policy, where the probabilities and consequences of events are more difficult to estimate than those of natural disasters because of terrorists' adaptive capabilities.

There are excellent examples of this kind of analysis, one of which I will cover here. Stewart and Mueller applied regulatory breakeven analysis to WBI scanners at airports.<sup>18</sup> The authors faced uncertainties in estimating costs and benefits but, using a series of conservative assumptions, concluded that the WBI machines would have to generate significant reductions in risk to justify the expense. Specifically, they concluded that

more than one attack every two years would need to *originate from U.S. airports* for AITs [advanced imaging technologies] to pass a cost-benefit analysis. In other words, to be cost-effective, AITs every two years would have to disrupt more than one attack effort with body-borne explosives that otherwise would have been successful despite other security measures, terrorist incompetence and amateurishness, and the technical difficulties in setting off a bomb sufficiently destructive to down an airliner.<sup>19</sup>

<sup>17</sup> Garrick Blalock, Vrinda Kadiyali, and Daniel H. Simon, "The Impact of 9/11 on Road Fatalities: The Other Lives Lost to Terrorism," *Applied Economics*, Vol. 41, No. 14, 2009.

<sup>18</sup> Stewart and Mueller, 2011.

<sup>19</sup> Stewart and Mueller, 2011 (emphasis added).

Given that we are seeing nowhere near this level of attack frequency with body-borne explosives, and given that the authors used consistently conservative assumptions, it can be concluded that the new security measures are not worth the costs.

Terrorists are unlikely to go away, and they seem intent on developing new and more-inventive ways of disrupting our society. Their intents, however, do not justify the blind application of restrictive security measures that impede commerce, compromise privacy, and imperil civil liberties. As my colleague Bob Poole noted, “[n]o security policy should be pursued ‘at all costs,’ since resources are always limited.”<sup>20</sup> This constraint will become increasingly intense as federal budgets tighten in the near future. Thus, it is imperative that we use the next decade to develop smarter, more-sustainable, and more-practical solutions to air travel security.

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<sup>20</sup> Robert W. Poole, “The Case for Risk-Based Aviation Security Policy,” *World Customs Journal*, Vol. 3, No. 2, September 2009.

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