

PASSENGER ACCEPTANCE OF PASSENGER SCREENING TECHNOLOGY

Statement of

Sandra L. Hyland, Ph.D.

Study Director, Panel on Commercial Aviation Security  
and

Vice Chair, Committee on Assessment of Security Technologies for Transportation  
Division on Engineering and Physical Sciences  
National Research Council  
The National Academies

before the

Subcommittee on Technology and Innovation  
Committee on Science and Technology  
U.S. House of Representatives

February 3, 2010

Good afternoon, Mr. Chairman and members of the Committee. My name is Sandra Hyland and I served as the study director for the 1996 NRC study *Airline Passenger Security Screening: New Technologies and Implementation Issues* as well as vice chair for the 2007 NRC study *Assessment of Millimeter-Wave and Terahertz Technology for Detection and Identification of Concealed Explosives and Weapons* (the form of imaging more commonly known as full-body scanners). The NRC--National Research Council--is the operating arm of the National Academy of Sciences, National Academy of Engineering, and the Institute of Medicine of the National Academies, chartered by Congress in 1863 to advise the government on matters of science and technology. I would like to clarify that I am not representing my employer, BAE Systems, but am here to discuss work I have done as an employee and a volunteer with the NRC over the past 16 years.

The FAA and, following the events of September 11, 2001, the TSA have sponsored numerous studies with the National Research Council in order to obtain expert, independent guidance on technology priorities and approaches, and we are pleased to continue this positive relationship. My testimony today will center on the earlier reports, and in particular, the committee's discussion related to the implementation issues associated with these technologies.

The 1996 NRC Report, *Airline Passenger Security Screening: New Technologies and Implementation Issues*, described not only the technical advances associated with security screening, but also the more practical side of that screening. It is important to understand that no technology, no matter how promising, will work unless it can be successfully implemented within the current aviation security infrastructure. To this end, in the 1996 report, the panel

addressed both the legal issues associated with passenger screening—most of which are related to the concepts of search, the expectation of privacy, and implied consent—as well as the more-difficult-to-quantify issue of public acceptance.

Although this report was written prior to the events of September 11, 2001, and during a time when the internet was in its infancy and “blogosphere” was neither a word nor a concept, it is my opinion that the panel’s underlying message—that it is important to assess the public’s reaction to, and acceptance of, the screening technologies—is still relevant. Critical differences between the passenger screening approach of today compared to that in 1996 include the federalization of the screening workforce and the assumption by the U.S government of the security screening operations. Compared to the “arms-length” responsibility the FAA had for passenger screening in 1996, the TSA is now mostly directly responsible for the purchase, deployment, and operation of security screening equipment and for the security screening personnel. This change in the role of the U. S. government in passenger screening does not obviate the need for TSA to assess the public acceptance of a specific security screening approach to strike a balance between security and a robust air travel business.

In their review of some specific potential passenger screening scenarios, the panel relied on this underlying assumption: people relate the level of inconvenience and invasion of privacy that they are willing to tolerate to their perception of the severity of the threat being averted and the effectiveness of the screening efforts at averting that threat. In airline passenger security screening, “people” refers not only to the passengers themselves, but to all the other air carrier

and airport personnel exposed to the screening process – including flight crews and air carrier and airport employees who work inside the sterile area of the airport.

The panel developed their recommendations through briefings from the FAA on potential technologies for screening passengers and from other government entities on their security screening approaches, and by holding a workshop attended by representatives of groups that would be affected by changes in passenger screening approaches. These groups included those representing airport management, consumer interests, and air-carrier employees. I have included a complete list of workshop attendees at the end of this document.

In 1996, the panel identified four categories of issues most relevant to the public acceptance of these technologies

- health
- privacy
- convenience, and
- comfort

People will differ in terms of the importance they place on the various concerns, and will also differ in their level of rejection of passenger screening technologies. Aside from considering the types of reactions new technologies may elicit, TSA will have to determine an acceptable level of opposition.

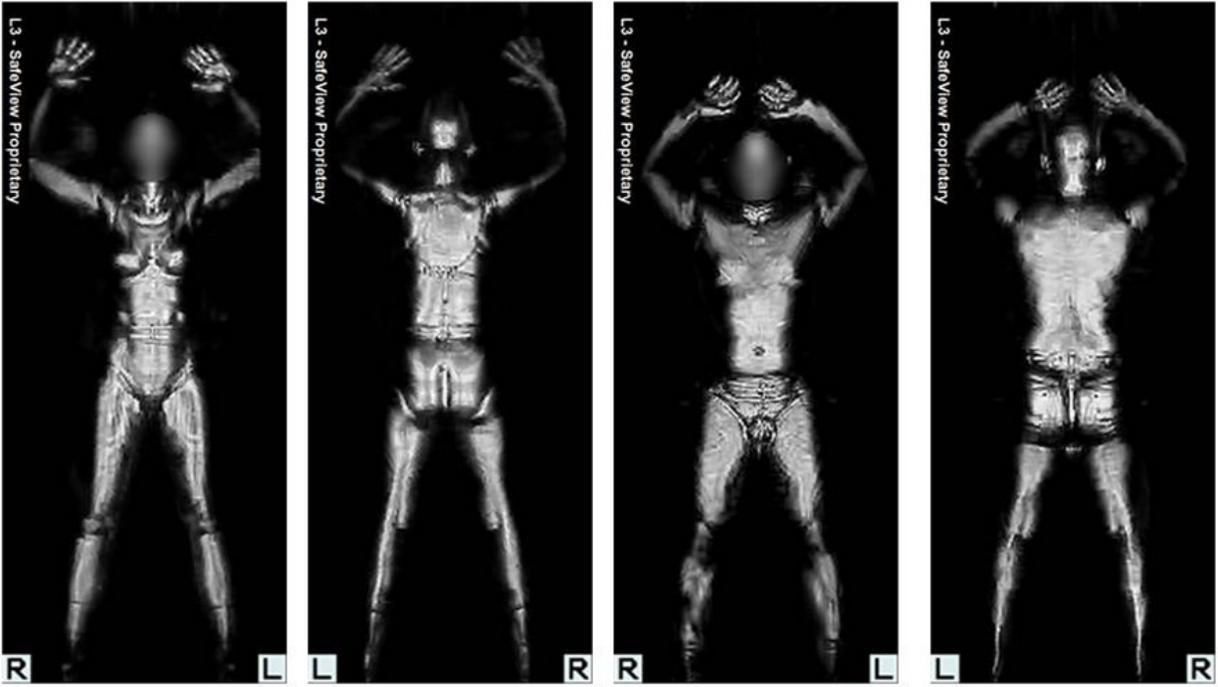
I will now briefly touch on each of the areas of concern identified by the panel.

### *Health*

Issues related to health are more related to the perception of potential health consequences than they are to any actual risks. Specifically, the panel noted that while the technologies themselves were safe, there are public concerns related to, for example, the potential consequences of exposure to the radiation used in active scanning technologies. For this reason, it will be important to be proactive in education related to the minimal exposure levels—and it will be important to convey this information in such a way that it is as accessible to the widest audience.

### *Privacy*

Issues related to privacy are probably the most significant in terms of whether or not the public will accept a new technology. For example, in the case of the full body imagers described in the 2007 report on millimeter-wave and terahertz technology, there are significant concerns when it comes to technology that can display a person's anatomical features.



*MMW image courtesy of Wikimedia commons: public domain.*

As the committee noted in the 2007 report related to this technology, even images with a resolution of 1 cm have significant detail to be embarrassing to many people, as can be seen in the example image shown above. These concerns may be exacerbated when the person being screened is a member of a culture for which modesty is important. Concerns also exist relative to the technology's potential to reveal such personal information as the use of an ostomy bag, or the presence of breast implants. For this reason it will be important that should this technology be adopted, it is done in such a way that the public's concerns about privacy are acknowledged and carefully balanced against the benefits of this technology's use. At the time the report was written, the panel noted that this technology would most likely only be accepted if the perceived threat level were high and the technology effective at averting that threat, but that quantifying just how high the threat would need to be would be difficult. In my opinion, given the reaction

to the attempted bombing of the Northwest Airlines Flight on Christmas, this may be the time to revisit the question of the effectiveness of this technology in identifying this kind of threat in actual airport use, and the level of threat at which the flying public would accept this technology as a primary screening approach.

The 1996 report identified five steps that might be taken to improve public acceptance of body imaging technologies:

- masking portions of the displayed image or distorting the image to make it appear less “human”
- using operators of the same gender as the subject to view the images
- ensuring that images are displayed in such a way as to be viewable only to the screener
- providing guarantees that images will not be preserved beyond the brief screening procedure, except when questionable objects are detected, and
- offering alternative screening procedures—such as a “pat down” for those who object to imaging

The committee noted in its 2007 report that many of these approaches have already been implemented in other countries. In particular, a field trial of one imaging system at Gatwick Airport in the United Kingdom found that the public response was favorable, and that the system was also successful in detecting concealed metal and ceramic weapons.

A second category of technology that has the potential to raise privacy concerns is that of trace explosives detection. As other technical experts have already likely explained, this technology allows for a sample to be taken from a subject (either by walking through a portal or by means of a hand-wand device). This sample is then analyzed for the presence of a chemical signature that would indicate the subject had been in contact with explosive material.

In this case the privacy concerns stem either from the potential for disclosure of information the passenger would rather be kept private (for example, the use of nitroglycerin for a heart condition), or the aversion that some people have to being touched. As with current “pat down” screenings, some of this can be ameliorated by ensuring that the person is screened by someone of the same gender and out of the immediate public view.

### *Convenience*

Convenience is largely related to time. In 1996, the panel noted that screening technologies that impose delays will also have problems with public acceptance.

Speaking from my own perception rather than as a member of the committee, the public has grown to grudgingly accept the need to arrive at the airport well-ahead of their anticipated departure to accommodate not only longer lines at security screening, but also the uncertainty in how long that screening might take. However, there may also have been some backlash as, for example, train ridership has gone up, with Amtrak recording record ridership each year from 2002 through 2008.

## *Comfort*

Issues related to comfort often arise when there is a technology that will require the person being screened to be in close contact either with the equipment or with another person. In some cases, comfort issues can also arise for technology that will require a person to be confined space—such as some trace explosives detection equipment and full body scanners do. In particular, trace detection portals—which also involve directed airflow—have the potential to raise comfort issues.

While there are ways to minimize this discomfort, in some cases this may result in a trade-off with technological effectiveness. For example, the use of airflow to collect samples for explosives detection may ameliorate the concerns of a passenger that does not want to be touched, but may not be as effective as the sampling that comes from direct contact.

In addition to reviewing potential public acceptance of new screening technologies, the panel noted that current screening technology could be made more effective by a better integration of the screening personnel into the system. The inability to maintain a high level of operator performance is a principal weakness of existing passenger screening systems and a potential weakness of future systems. Improving current technologies and developing new technologies both require determining the optimum integration of technological development and human operators into the overall security system.

To ensure an effective screening system, it is imperative to assess the public acceptance of technology and balance that against its benefits before making any decisions about the course to be used. The final part of my statement will review the ways in which the panel discussed how that may be done.

### *Assessing Public Acceptance*

In 1996, the panel found that there had been very little work done to study the public acceptance of screening technologies, and when this topic was revisited relative to the committee's work on the whole-body imagers in 2007, that had not changed. Yet, it's clear that the public perception and acceptance can have a large impact on the behavior of travelers (as I noted with increased use of passenger rail in the northeast corridor).

Additionally, the panel identified a number of intangibles that go into the public's willingness to accept inconvenience, including

- the nature, extent, and likelihood of the actual threat and the associated risk (Certainly, this changed between 1996 and September 11th)
- the degree of understanding and the perception of the actual threat and the associated risks
- personal beliefs, habits, and cultural mores
- the physical, mental, and emotional state of an individual
- the extent and degree of public understanding of the screening objectives, technology, and procedures

- public perception of the effectiveness of the screening system
- public understanding and perception of the health risks associated with the screening system, and
- the nature and frequency of air travel.

The panel also identified two ways in which the public acceptance of this technology might be measured:

- by surveying the population most likely to be affected by passenger screening, which has the potential to be of limited value due to the self-selective nature of the survey and the likely introduction of sampling error, and
- by identifying similar or analogous circumstances in the past and studying available information related to the public reaction to—or acceptance of—these circumstances. In this case, reaction to metal detectors and baggage scans might provide insight.

However, the panel stated that there is no better way to gauge public acceptance of new screening technologies than by way of field tests. For this reason the panel strongly encouraged that in addition to performance data, information related to the public acceptance of this technology also be collected.

I would like to conclude my remarks with some personal views regarding the input from the participants in the panel's workshops. Many of the representatives from airport operations and air carrier groups expressed the concern that the FAA would impose new screening technology without sufficient consideration of passenger acceptance. Travel by air is a largely voluntary

activity – people can choose to take the family to Disney World by air, or they can drive to a nearby attraction. Even business people have a wide variety of tools that can help them minimize air travel, including web-based meetings and other internet-enabled communications. Air carriers are acutely aware that travelers make these types of trade-offs regularly, and increasing the burden of passenger security screening can potentially push those trade-offs in favor of travel by car, train, or bus. Including the air carriers, airport operators, and other industry representatives in the assessment and deployment of new passenger screening technology is likely to be the best way to ensure the successful implementation of new security technologies.

Thank you for the opportunity to testify today. I would be pleased to address any questions the subcommittee may have.

Summary of organizations that participated in the panel's workshop

Organizations attending workshop	Organizations invited but not attending
<p>Air Transport Association of America</p> <p>Airport Law Enforcement Agents Network</p> <p>American Association of Airport Executives</p> <p>Airports Council International North America</p> <p>American Civil Liberties Union</p> <p>Association of Flight Attendants</p> <p>Aviation Consumer Action Project</p> <p>ITS (provider of airport security services)</p> <p>Regional Airline Association</p>	<p>Air Line Pilots Association, International</p> <p>Allied Pilots Association</p> <p>American Society of Travel Agents</p> <p>Electronic Privacy Information Center</p> <p>Families of Pan Am 103 Lockerbie</p> <p>Victims of Pan Am 103</p>