
How can the statistics profession maximize its impact on national defense, homeland security, and counterterrorism?

Statistics and Counterterrorism

Jon Kettenring

Terrorism is a terrible topic to have to deal with. We all wish it would disappear even if we fear that it won't.

Terrorism has both national and international aspects to it, and it manifests itself in numerous ways, giving rise to a host of technical challenges. Thus, it is no surprise that the threat is of great concern to many branches of government, including the Centers for Disease Control and Prevention, the Intelligence Community, the Department of Energy, the Department of Defense, and the new Department of Homeland Security.

Statistical science can help to mitigate the risks involved. Two years ago, Banks (2002) wrote that statisticians could contribute to U.S. security by improving statistical methods used in risk analysis, profiling, identifying disease clusters, and securing electronic information networks. Articles in this issue will describe some of the work that has been done in these areas as well as in biometrics

In remarks at a conference on statistical issues in counterterrorism held in Washington, D.C. last May, Dr. Penrose (Parney) Albright, Nominee for Assistant Secretary (Plans, Programs & Budgets), Department of Homeland Security, further identified areas where



statistics can contribute: monitoring the environment, establishing sensitivities, minimizing false detection rates, influencing standards, determining operating curves, analyzing credit card fraud, accounting for cultural biases, figuring out natural levels of radiation under various local conditions, and presenting fair and objective stories about risk to the public. Sampling, experimental design, modeling, sensitivity analysis, and graphical presenta-

tion are among the obviously applicable statistical methods for such problems, but others are needed to provide satisfactory solutions.

Many in the statistics profession are already engaged in statistical methodologies related to counterterrorism efforts and the broader challenges of national defense and homeland security. There is a substantial history of statisticians stepping forward to help in times of national crisis. Some of that

history is beautifully documented by Wallis (1981), who recounts how the Statistics Research Group, based at Columbia University during World War II, supported the needs of the Army, Navy, Air Force, Marines, and others. The invention of sequential analysis was one of many outputs of this distinguished group.

When the Statistics Research Group was in operation, there was very little statistics infrastructure in the United States. The National Science Foundation did not yet exist. The first university statistics departments were not yet in place. Indeed, several members of the SRG were later instrumental in launching and developing the early U.S. statistics departments after the war.

Today, the infrastructure of statistics is broader, firmer, and better positioned to help ensure that the discipline is contributing what it can and should to national defense, homeland security, and counterterrorism. Nevertheless, community leaders continue to struggle with how best to position the profession to maximize its impact.

As a recent reflection of this concern, a meeting was held in Washington, D.C. in December 2002 to ponder ways in which the statistics profession could increase its effectiveness in the national defense and homeland security arenas. Thirty participants were drawn from a broad section of government, academia, and industry. Karr (2003) outlines the key questions of the meeting, which addressed statistics infrastructure and government infrastructure. The former focused on defining what statistical infrastructure is already in place and determining how to expand and improve it so that statistical research would have a larger impact. Questions pertaining to the latter concerned identifying where, in the current government structure, are needs for improved statistical thinking greatest and how the statistics community can best respond to those needs. Among other outcomes, the meeting established momentum for moving ahead on several fronts under the auspices of a continuing committee, chaired by Alan Karr, director of the National Institute of Statistical Sciences (NISS). Other members are John Bailar, National Academy of




Sciences; Stephen Fienberg, Carnegie Mellon University; William Hanley, Lawrence Livermore National Laboratory; Sallie Keller-McNulty, Los Alamos National Laboratory; Albert Madansky, University of Chicago; Vijay Nair, University of Michigan; Nancy Spruill, Office of the Secretary of Defense; and myself.

The committee has been tracking development of the new Department of Homeland Security because of its significant responsibility for information analysis and support. The Homeland Security Act of 2002, which created the DHS, specifically mentions information integration, risk assessment, data mining, advanced analytical tools, and other topics that have strong statistical components. Albright's comments, mentioned above, provide specific examples of DHS needs. The department will also have a Homeland Security Advanced Research Projects Agency and a Science and Technology Advisory Committee. Clearly, the statistics community can contribute much to the success of this new department through research and leadership service.

Another opportunity is to educate the statistics research community on priority research needs for information analysis that will assist the counterterrorism and DHS causes. To determine and prioritize these research needs the committee is planning a cross-disciplinary (statistics, mathematics, computer science) workshop to be held in spring 2004 at NISS.

One way to sustain focus on critical issues is to strengthen parts of the existing infrastructure while establishing parts that do not yet exist. As an example, the American Statistical Association has long had a standing committee on statisticians in defense and national security. It is now going through the process of converting to a full-blown Section. Section status will provide increased influence, visibility, permanency, and impact for statisticians interested in these problems.

Perhaps the ultimate infrastructure issue for the community is statistical education. We are already experiencing a shortfall of trained statisticians. Posts in industry, government laboratories, and government agencies go unfilled. The answer to the question of why more statisticians are not currently involved in defense and national security problems is that the pipeline of statistics graduates entering the workforce is too small. The situation is summarized in a report prepared for the National Science Foundation (2003): "Meanwhile, the shortage may prove quite damaging to the nation's infrastructure, especially in this period of heightened concerns about national defense and security—areas to which statistics has much to offer."

Statistical counters to terrorism will not dissolve it, but they can contribute to the battle. Assuring that our statistics infrastructure is well-positioned for the campaign should help considerably. 

References

- Banks, D. L. 2002. "Statistics for Homeland Defense," *Chance*, 15, 8-10.
- Karr, A. F. 2003. "Statistics and National Defense and Security," *Amstat News*, 308, 15.
- Report Prepared for the National Science Foundation. 2003. *Statistics: Challenges and Opportunities for the Twenty-First Century*, B. Lindsay, J. Kettenring, and D. Siegmund, eds., www.stat.psu.edu/%7Ebgll/nsf_report.pdf.
- Wallis, W. A. 1980. "The Statistical Research Group, 1942-1945 (with discussion)," *Journal of the American Statistical Association*, 75, 320-330.