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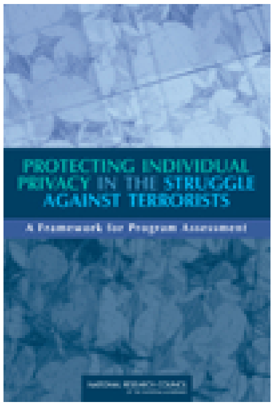

Protecting Individual Privacy in the Struggle Against Terrorists: A Framework for Program Assessment

Committee on Technical and Privacy Dimensions of Information for Terrorism Prevention and Other National Goals, National Research Council

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All U.S. agencies with counterterrorism programs that collect or "mine" personal data&nbsp;-- such as phone records or Web sites visited&nbsp;-- should be required to evaluate the programs' effectiveness, lawfulness, and impacts on privacy. A framework is offered that agencies can use to evaluate such information-based programs, both classified and unclassified. The&nbsp;book urges Congress to re-examine existing privacy law to assess how privacy can be protected in current and future programs and recommends that any individuals harmed by violations of privacy be given a meaningful form of redress. Two specific technologies are examined: data mining and behavioral surveillance. Regarding data mining, the&nbsp;book concludes that although these methods have been useful in the private sector for spotting consumer fraud, they are less helpful for counterterrorism because so little is known about what patterns indicate terrorist activity. Regarding behavioral surveillance in a counterterrorist context, the&nbsp;book concludes that although research and development on certain aspects of this topic are warranted, there is no scientific consensus on whether these techniques are ready for operational use at all in counterterrorism.

Executive Summary

In a democratic society it is vitally important that citizens and their representatives be able to make an informed judgment on how to appropriately balance privacy with security. This report seeks to contribute to that informed judgment.

September 11, 2001, provided vivid proof to Americans of the damage that a determined, fanatical terrorist group can inflict on our society. Based on the available information about groups like Al Qaeda, most importantly their own statements, it seems clear that they will continue to try to attack us. Further attacks by such groups, and indeed by domestic terrorists like Timothy McVeigh, could be as serious as, or even more serious than, September 11 and Oklahoma City. Because future terrorist attacks on the United States could cause major casualties as well as severe economic and social disruption, the danger they pose is real, and it is serious. Thus, high priority should be given to developing programs to detect intended attacks before they occur so that there is a chance of preventing them.

At the same time, the nation must ensure that its institutions, information systems, and laws together constitute a trustworthy and accountable system that protects U.S. citizens' rights to privacy.

In this report, the Committee on Technical and Privacy Dimensions of Information for Terrorism Prevention and Other National Goals examines the role of data mining and behavioral surveillance technologies in counterterrorism programs,[1] and it provides a framework for making decisions about deploying and evaluating those and other information-based programs on the basis of their effectiveness and associated risks to personal privacy.

The most serious threat today comes from terrorist groups that are international in scope. These groups make use of the Internet to recruit, train, and plan operations, and they use public channels to communicate. Therefore, intercepting and analyzing these information streams might provide important clues regarding the nature of the terrorist threat. Important clues might also be found in commercial and government databases that record a wide range of information about individuals, organizations, and their transactions, movements, and behavior. But success in such efforts will be extremely difficult to achieve because:

- The information sought by analysts must be filtered out of the huge quantity of data available (the needle in the haystack problem); and
- Terrorist groups will make calculated efforts to conceal their identity and mask their behaviors, and will use various strategies such as encryption, code words, and multiple identities to obfuscate the data they are generating and exchanging.

Modern data collection and analysis techniques have had remarkable success in solving information-related problems in the commercial sector; for example, they have been successfully applied to detect consumer fraud. But such highly automated tools and techniques cannot be easily applied to the much more difficult problem of detecting and preempting a terrorist attack, and success in doing so may not be possible at all. Success, if it is indeed achievable, will require a determined research and development effort focused on this particular problem.

Detecting indications of ongoing terrorist activity in vast amounts of communications, transactions, and behavioral records will require technology-based counterterrorism tools. But even in well-managed programs such tools are likely to return significant rates of false positives, especially if the tools are highly automated. Because the data being analyzed are primarily about ordinary, law-abiding citizens and businesses, false positives can result in invasion of their privacy. Such intrusions raise valid concerns about the misuse and abuse of data, about the accuracy

[1] In this report, the term "program" refers to the system of technical, human, and organizational resources and activities required to execute a specific function. Humans—not computers—are always fully responsible for the actions of a program.

of data and the manner in which the data are aggregated, and about the possibility that the government could, through its collection and analysis of data, inappropriately influence individuals' conduct. Intruding on privacy also risks ignoring constitutional concerns about general search, as reflected in the Fourth Amendment. The committee strongly believes that such intrusion must be minimized through good management and good design, even if it cannot be totally eliminated.

The difficulty of detecting the activity of terrorist groups through their communications, transactions, and behaviors is hugely complicated by the ubiquity and enormity of electronic databases maintained by both government agencies and private-sector corporations. Retained data and communication streams concern financial transactions, medical records, travel, communications, legal proceedings, consumer preferences, Web searches, and, increasingly, behavioral and biological information. This is the essence of the information age—it provides us with convenience, choice, efficiency, knowledge, and entertainment; it supports education, health care, safety, and scientific discovery. Everyone leaves personal digital tracks in these systems whenever he or she makes a purchase, takes a trip, uses a bank account, makes a phone call, walks past a security camera, obtains a prescription, sends or receives a package, files income tax forms, applies for a loan, e-mails a friend, sends a fax, rents a video, or engages in just about any other activity. The proliferation of security cameras and means of tagging and tracking people and objects increases the scope and nature of available data. Law-abiding citizens leave extensive digital tracks, and so do criminals and terrorists.

Gathering and analyzing electronic, behavioral, biological, and other information can play major roles in the prevention, detection, and mitigation of terrorist attacks, just as they do against other criminal threats. In fact the U.S. government has increased its investment in counterterrorism programs based on communications surveillance, data mining, and information fusion. Counterterrorism agencies are particularly interested in merging several different databases (information fusion) and then probing the combined data to understand transactions and interactions of specific persons or organizations of interest (data mining). They would also like to identify individuals (through data mining and behavioral surveillance) whose transactions and behavior might indicate possible terrorist links.

Such techniques often work well in commercial settings, for example for fraud detection, where they are applied to highly structured databases and are honed through constant use and learning. But the problems confronting counterterrorism analysts are vastly more difficult. Automated identification of terrorists through data mining (or any other known methodology) is neither feasible as an objective nor desirable as a goal of technology development efforts.

One reason is that collecting and examining information to inhibit terrorists inevitably conflicts with efforts to protect individual privacy. And when privacy is breached, the damage is real. The degree to which privacy is compromised is fundamentally related to the sciences of database technology and statistics as well as to policy and process. For example, there is no way to make personal information in databases fully anonymous. Technical, operational, legal, policy, and oversight processes to minimize privacy intrusion and the damage it causes must be established and uniformly applied. Even under the pressure of threats as serious as terrorism, the privacy rights and civil liberties that are the cherished core values of our nation must not be destroyed.

The quality of the data used in the difficult task of preempting terrorism is also a substantial issue. Data of high quality are correct, current, complete, and relevant, and so they can be used effectively, economically, and rapidly to inform and evaluate decisions. Data derived by linking high-quality data with data of lesser quality will tend to be low-quality data. Because data of questionable quality are likely to be the norm in counterterrorism, analysts must be cognizant of their effects, especially in fused or linked databases, and officials must carefully consider the consequent likelihood of false positives and privacy intrusions.

The preliminary nature of the scientific evidence, the risk of false positives, and operational vulnerability to countermeasures argue for behavioral observation and physiological monitoring being used at most as a preliminary screening method for identifying individuals who merit additional follow-up investigation. Although laboratory research and development of techniques for automated, remote detection and assessment of anomalous behavior, for example deceptive behavior, may be justified, there is not a consensus within the relevant scientific community nor on the committee regarding whether any behavioral surveillance or physiological monitoring techniques are ready for use at all in the counterterrorist context given the present state of the science.

The committee has developed and provides in Chapter 2 a specific framework for evaluation and operation of information-based counterterrorism programs to guide deployment decisions and facilitate continual improvement of the programs.

National security authorities of course should always adhere to the law, but the committee recognizes that laws will have to be reviewed and revised from time to time to ensure that they are appropriate, up to date, and responsive to real needs and contemporary technologies.

With these several concerns and issues in mind, the committee makes the following recommendations.

Recommendation 1. U.S. government agencies should be required to follow a systematic process (such as the one described in the framework proposed in Chapter 2) to evaluate the effectiveness, lawfulness, and consistency with U.S. values of every information-based program, whether classified or unclassified, for detecting and countering terrorists before it can be deployed, and periodically thereafter. Under most circumstances, this evaluation should be required as a condition for deployment of information-based counterterrorism programs, but periodic evaluation and continual improvement should *always* be required when such programs are in use. The committee believes that the framework presented in Chapter 2 defines an appropriate process for this purpose.

Periodically after a program has been operationally deployed, and in particular before a program enters a new phase in its life cycle, policy makers should apply a framework such as the one proposed in Chapter 2 to the program before allowing it to continue operations or to proceed to the next phase. Consistency with relevant laws and regulations, and impact on individual privacy and civil liberties—as well as validity, effectiveness, and technical performance—should be rigorously assessed. Such review is especially necessary given that the committee found little evidence of any effective evaluation performed for current programs intended to detect terrorist activity by automated analysis of databases. (If such evidence does exist, it should be presented in the appropriate oversight forums as part of such review.) Periodic review may result in significant modification of a program or even its cancellation.

Any information-based counterterrorism program of the U.S. government should be subjected to robust, independent oversight. All three branches of government have important roles to play to ensure that such programs adhere to relevant laws. **All such programs should provide meaningful redress to any individuals inappropriately harmed by their operation.**

To protect the privacy of innocent people, the research and development of any information-based counterterrorism program should be conducted with synthetic population data. If and when a program meets the criteria for deployment in the committee's illustrative framework described in Chapter 2, it should be deployed only in a carefully phased manner, e.g., being field tested and evaluated at a modest number of sites before being scaled up for general use. At all stages of a phased deployment, data about individuals should be rigorously subjected to the full safeguards of the framework.

Recommendation 2. The U.S. government should periodically review the nation's laws, policies, and procedures that protect individuals' private

information for relevance and effectiveness in light of changing technologies and circumstances. In particular, Congress should reexamine existing law to consider how privacy should be protected in the context of information-based programs (e.g., data mining) for counterterrorism. Such reviews should consider establishment of restrictions on how personal information can be used. Currently, legal restrictions are focused primarily on how records are collected and assessed, rather than on their use.

PROTECTING INDIVIDUAL PRIVACY IN THE STRUGGLE AGAINST TERRORISTS

A Framework for Program Assessment

Committee on Technical and Privacy Dimensions of Information
for Terrorism Prevention and Other National Goals

Committee on Law and Justice and Committee on National Statistics
Division on Behavioral and Social Sciences and Education

Computer Science and Telecommunications Board
Division on Engineering and Physical Sciences

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Preface

In late 2005, the National Research Council (NRC) convened the Committee on Technical and Privacy Dimensions of Information for Terrorism Prevention and Other National Goals. Supported by the U.S. Department of Homeland Security and the National Science Foundation, the committee was charged with addressing information needs of the government that arise in its deployment of various forms of technology for broad access to and analysis of data as it faces the challenges of terrorism prevention and threats to public health and safety. Specifically of interest was the nexus between terrorism prevention, technology, privacy, and other policy issues and the implications and issues involved in deploying data mining, information fusion, and behavioral surveillance technologies. The study sought to develop a conceptual framework that policy makers and the public can use to consider the utility, appropriateness, and empirical validity of data generated and analyzed by various forms of technology currently in use or planned in the near future. The committee notes that the development of this framework did not include the development of systems for preventing terrorism. By design and in response to the charge for the study, this report focuses on data mining and behavioral surveillance as the primary techniques of interest.

The committee interpreted its charge as helping government policy makers to evaluate and make decisions about information-based programs to fight terrorism or serve other important national goals, and it thus sought to provide a guide for government officials, policy makers, and technology developers as they continue to explore new surveillance tools in the service of important national security goals. Chapter 1 scopes the issues involved and introduces key concepts that are explored in much greater depth in the appendixes. Chapter 2 outlines a framework for a systematic assessment of information-based programs being considered or already in use for counterterrorist purposes (and other important national needs, such as law enforcement and public health) in terms of each program's effectiveness and its consistency with U.S. laws and values. Chapter 3 provides the committee's conclusions and recommendations. The appendixes elaborate extensively on the scientific and technical foundations that underpin the committee's work and the legal and organizational context in which information-based programs necessarily operate. The committee regards the appendixes as essential elements of the report.

Note that although the committee heard from representatives from many government agencies, this report does not evaluate or critique any specific U.S. government program. Rather, it is intended to provide policy makers with a systematic framework for thinking about existing and future operational information-based programs, especially in a counterterrorist context.

Nowhere is the need for this study and the framework it proposes more apparent than in the history of the Total Information Awareness (TIA) program. Indeed, the TIA program and the issues it raised loomed large in the background when this committee was appointed, and although the TIA program was terminated in September 2003, it is safe to say that the issues raised by this program have not been resolved in any fundamental sense. Moreover, many other data mining activities supported by the U.S. government continue to raise the same issues: the potential utility of large-scale databases containing personal information for counterterrorist and law enforcement purposes and the potential privacy impact of law enforcement and national security authorities using such databases. A brief history of the TIA program is contained in Appendix J.

The committee consisted of 21 people with a broad range of expertise, including national security and counterterrorism, intelligence and counterintelligence, privacy law and information protection, organizations and organizational structure, law enforcement, statistics, information technology, cognitive psychology, terrorism, database architecture, public health, artificial intelligence, databases, cryptography, machine learning and statistics, and information retrieval.

From 2005 to 2007, the committee held six meetings, most of which were intended to enable it to explore a wide range of points of view. For example, briefings and other inputs were obtained from government officials at all levels, authorities on international law and practice relating to policy, social scientists and philosophers concerned with collection of personal data, experts on privacy-enhancing technologies, business representatives concerned with the gathering and uses of personal data, and researchers who use personal data in their work. Several papers were commissioned and received, as well as a number of contributed white papers.

Preparation of the report was undertaken on an unclassified basis. Although a number of classified programs of the U.S. government make use of data mining, the fundamental principles of data mining themselves are not classified, and these principles apply to both classified and unclassified applications. Thus, at the level of analysis presented in this report, the fact that some of the U.S. government's counterterrorist programs are classified does not materially affect the analysis provided here. In addition, the U.S. government operates a variety of classified programs intended to collect data that may be used for counterterrorist purposes. However, as collection programs, they are out of the scope of this report, and all that need be noted is that they produce data relevant to the counterterrorist mission and that data mining and information fusion technologies must process.

This study could not have been undertaken without the support of the government project officers, Larry Willis, U.S. Department of Homeland Security, and Larry Brandt and Brian D. Humes, National Science Foundation, who recognize the complex issues involved in developing and using new technologies to respond to terrorism and other national efforts, such as law enforcement and public health, and the need to think through how this might best be done.

Given the scope and breath of the study, the committee benefited greatly from the willingness of many individuals to share their perspectives and expertise. We are very grateful to the following individuals for their helpful briefings on technologies for data mining and detection of deception: Paul Ekman, University of California, San Francisco; Mark Frank, University of Buffalo; John Hollywood, RAND Corporation; David Jensen, University of Massachusetts; Jeff Jonas, IBM; David Scott, Rice University; John Woodward, RAND Corporation; and Thomas Zeffiro, Georgetown University. Useful insights on the use of these technologies in the private sector were provided by Scott Loftnesness, Glenbrook Partners, and Dan Schutzer, Financial Services Technical Consortium. William Winkler, Census Bureau, helped the committee understand the technologies' potential impact on federal statistical agencies.

Background briefings on relevant privacy law and policy were provided by Henry Greely, Stanford University; Barry Steinhardt, American Civil Liberties Union; Kim Taipale, Center for Advanced Studies in Science and Technology Policy; and Lee Tien, Electronic Frontier Foundation. We also benefited from the expert testimony of Whitfield Diffie, Sun Microsystems; John Pike, Global Security; and Jody Westby, Global Cyber Risk, on the role of information technologies in counterterrorism. In addition to counterterrorism, the impact and implications of data mining for law enforcement and public health were important foci of the committee's work. In the public health area, the following persons contributed to the committee's understanding: James Lawler, Homeland Security Council, White House; Farzad Mostashari, New York City Public Health Department; Patricia Quinlisk, State of Iowa; and Barry Rhodes and Lynn Steele, Centers for Disease Control and Prevention. Useful insights on the role of law enforcement in counterterrorism were provided in presentations made by Roy Apseloff, National Media Exploitation Center; Michael Fedarcyk, Federal Bureau of Investigation (retired); and Philip Reitinger, Microsoft. We found extremely helpful the international perspectives of Joe Connell, New Scotland Yard (retired), and Ravi Ron, former head of Israel's Ben Gurion Airport.

This study also benefited considerably from briefings by government officials involved on a daily basis with the issues at the heart of the study. We particularly want to thank Randy Ferryman and Admiral Scott Redd from the National Counter Terrorism Center and Clint C. Brooks (retired) from the National Security Agency, who shared their vision of how the nation should conduct its counterterrorism activities while maintaining its democratic ideals. Numerous staff members from the Department of Homeland Security (DHS) also shed important light on government activities relating to terrorism prevention, including Mel Bernstein, Timothy Keefer, Hyon Kim, Sandy Landsberg, John V. Lawler, Tiffany Lightbourn, Grace Mastalli, Allison Smith, and Lisa J. Walby. Toby Levin was particularly helpful in sharing timely and relevant information on the work of the DHS Privacy Office, and the committee appreciated the interest of the DHS Data Privacy and Integrity Advisory Committee in its work and their willingness to keep members abreast of their activities and role in protecting privacy.

The committee also thanks Michael D. Larsen of Iowa State University and Peter Swire of Ohio State University, who responded to its request for white papers, and Amy Corning and Eleanor Singer, University of Michigan, who prepared an informative paper on public opinion.

This study involved NRC staff from three different NRC units. We would like to thank them for their valuable assistance to this project as well as for their collegiality, which contributed to a far richer experience for all involved. Betty Chemers of the NRC's Committee on Law and Justice served as study director and organized and facilitated the meetings, Michael Cohen of the Committee on National Statistics provided technical expertise on statistical and data mining issues, and Herbert

Lin of the Computer Science and Telecommunications Board undertook the difficult job of turning the committee's writing contributions into a coherent whole and working with the co-chairs to mediate and resolve intellectual disagreements within the committee. Carol Petrie provided guidance and support throughout the study process. We would also like to thank Julie Schuck and Ted Schmitt for their research assistance and Jennifer Bishop, Barbara Boyd, Linda DePugh, and Janice Sabuda for their administrative support. Finally, we greatly appreciate the efforts undertaken by Eugenia Grohman, Susan Maurizi, Kirsten Sampson Snyder, and Yvonne Wise to complete the review and editing processes and bring this report to fruition.

Charles M. Vest and William J. Perry, *Co-chairs*
Committee on Technical and Privacy
Dimensions of Information for Terrorism
Prevention and Other National Goals

Acknowledgment of Reviewers

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Research Council's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process. We wish to thank the following individuals for their review of this report:

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Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations, nor did they see the final draft of the report before its release. The review of this report was overseen by William H. Press, University of Texas at Austin, and James G. March, Stanford University. Appointed by the National Research Council, they were responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

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