

# Making the Nation Safer



## The Role of Science and Technology in Countering Terrorism

NRC Committee on Science and Technology  
for Countering Terrorism

Lew Branscomb and Rick Klausner, co-chairs

<http://books.nap.edu/html/stct/>

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# Panels / chapters



- ⌘ Nuclear and radiological threats
- ⌘ Human and agricultural health systems
- ⌘ Toxic chemicals and explosive materials
- ⌘ Information technology
- ⌘ Energy systems
- ⌘ Transportation systems
- ⌘ Cities and fixed infrastructure
- ⌘ The response of people to terrorism
- ⌘ Complex and interdependent systems

# **NRC Committee on Science and Technology for Countering Terrorism**




## **Information Technology Panel**

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William Brinkman, John Cioffi, Bruce Croft,  
Bill Crowell, Jeff Jaffe, Butler Lampson, Ed  
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More interest than any other topic at the  
6/25 Hill briefing of the report

# IT (the nation's computer and communication system) is:



- ⌘ A critical infrastructure in and of itself
- ⌘ A major component of other elements of our critical infrastructure, such as the energy and transportation systems
  - ☒ Thus, a weapon and/or point of attack against other targets
- ⌘ A major element in the prevention, detection, and mitigation of terrorist attacks

# Four major elements




- ⌘ The Internet
- ⌘ The telecommunications infrastructure
- ⌘ Embedded / real-time computing (e.g., avionics, SCADA (Supervisory Control And Data Acquisition) systems)
- ⌘ Dedicated computing devices (e.g., desktop systems)

# Threats associated with our I T infrastructure



- ⌘ The target may be the I T itself
- ⌘ The target may be another of our society's infrastructures, with I T used ...
  - ☒ To launch the attack
  - ☒ To exacerbate the attack
  - ☒ To interfere with attempts to achieve a timely and effective response to the attack
- ⌘ Widespread destruction is not required for effectiveness
  - ☒ Loss of confidence may suffice – e.g., crash a single fly-by-wire aircraft

# Example: Supervisory Control and Data Acquisition (SCADA) systems



⌘ An information system attack could result in irreversible physical damage

⌘ Characteristics:

- ☒ Control *and* monitoring
- ☒ Minimal attention to security
- ☒ COTS components
- ☒ Increasingly large-scale, integrated, and distributed
- ☒ Information regarding vulnerabilities is readily available

# Modes of attack



- ⌘ Through the wires
- ⌘ Physical destruction of IT assets
- ⌘ Compromising trusted insiders

# Short-term recommendations



- ⌘ Increase the security of emergency response agencies' communications systems
- ⌘ Promote the use of best practices in information and network security
- ⌘ Ensure that a mechanism exists for providing authoritative IT support to federal, state, and local agencies that have immediate responsibilities for responding to a terrorist attack

# Long-term recommendations



## ⌘ Research in

- ☒ Information and network security
- ☒ New IT for emergency response (C3I – command, control, communications, and information)
- ☒ New IT for detection, remediation, and attribution of attacks (information fusion)

# Information and network security



⌘ Authentication, detection, and identification

⌘ Containment

⌘ Recovery

⌘ New security models (beyond “perimeter”)

⌘ Cross-cutting

☑ Reducing buggy code, reducing configuration errors, auditing functionality, managing functionality/security tradeoffs, security metrics, intelligence gathering, field studies of security

⌘ *People!*

# IT and C3I for emergency response



- ⌘ Ad hoc interoperability
- ⌘ Emergency management of communications capacity
- ⌘ Security of rapidly deployed ad hoc networks
- ⌘ Information management and decision support tools
- ⌘ Communications with the public during an emergency
- ⌘ Emergency sensor deployment
- ⌘ Precise location identification
- ⌘ Managing the physical IT infrastructure
- ⌘ Characterizing the functionality of regional networks for emergency responders

# Information fusion



- ⌘ Data mining
- ⌘ Data integration
- ⌘ Language technologies
- ⌘ Image and video processing
- ⌘ Evidence combination
- ⌘ Privacy and confidentiality

# If you want to know what happened ...

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⌘ Read the book!

📄 <http://books.nap.edu/html/stct/>

