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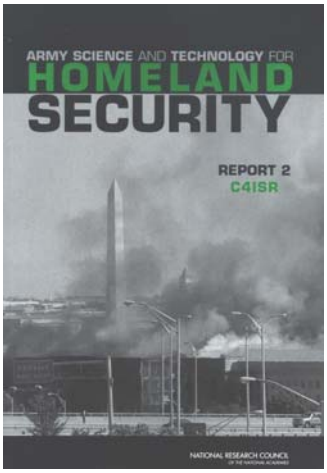
Army Science and Technology for Homeland Security: Report 2—C4ISR—*Summary*

BOARD ON ARMY SCIENCE AND TECHNOLOGY

Introduction



Shortly after the events of September 11, 2001, the U.S. Army asked the National Research Council (NRC) to study how science and technology could assist the Army meet its Homeland defense obligations. The first report, *Science and Technology for Army Homeland Security—Report 1,* presented a survey of a broad range of technologies and recommended applying Future Force technologies to homeland security wherever possible. In particular, the report noted that the Army should play a major role in providing emergency command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) capabilities and that the technology and architecture needed for homeland security C4ISR was compatible with that of the Army's Future Force. This second report focuses on C4ISR and how it can facilitate the Army's efforts to assist the Department of Homeland Security (DHS) and emergency responders meet a catastrophic event.

Background

Although the Department of Homeland Security (DHS) is developing plans for emergency response to a major terrorist attack, a comprehensive model for homeland security is still to be developed. It is clear, however, that any framework will involve a partnership between civilian responders at all government levels and the U.S. Army.

Of the Services, the Army has the most experience to support civilian authorities. The Army National Guard, given its historic mission and inherent flexibility under either state or federal control, is ideally suited to lead the Army's homeland security mission, a role it is already developing. In addition, the Army has the necessary research, development, testing, and evaluation (RDT&E) organization to assist emergency responders with the development of critical technology. Finally, the Army's Future Force network-centric warfare capabilities could be applicable to emergency responders.

The ways in which the Army and the emergency responder community acquire technologies in the form of new products, processes, and procedures differ widely. The DOD has a very well developed model for acquisition, with formal procedures and top-

to-bottom management. The emergency responders acquire new technology through local city and municipal purchasing agents. The DOD process is controlled by standards of practice and rigorous testing and certification, while the emergency responder community has far fewer formal procedures and sometimes none at all. Many in the emergency responder community are concerned by the lack of standardization and certification of items that they must purchase. The deliberate nature of the DOD acquisition process is perceived by some to be cumbersome and slow to react. To address this concern, the Army is developing new acquisition processes to accelerate adoption of new technology. One such process, spiral development, could be particularly well suited for C4ISR capabilities for emergency responders, and DHS should consider adopting that model. It is also important that DHS adopt a more formal RDT&E process and encourage standardization of equipment.

An examination of the requirements for the emergency responder community caused the committee to conclude that responders and Army forces share many common needs. Central to the Army's Future Force is the concept of network-centric warfare (NCW). In addition to individual C4ISR technologies, the committee observes that the Army's network-centric approach to operations could serve emergency responders equally effectively. Such a system could produce significant efficiencies in terms of sharing skills, knowledge, and scarce, high-value assets; building capacity and redundancy in the national emergency response system; and gaining the synergy of providing a common operating picture to all responders.

The requirement for C4ISR is ubiquitous, whether for the Army's Future Force or for the future emergency responder. Quick action on the part of the Army can provide beneficial C4ISR solutions to the Department of Homeland Security that will ensure a high level of interoperability between emergency responders and the Army should our nation be forced again to respond to a catastrophic event on U.S. soil.

Findings and Recommendations

Capabilities Needed for Emergency Responders Because emergency responders and the Army have many common needs, individual C4ISR technologies and the Army's network centric approach to operations could serve emergency responders very effectively. The network centric capabilities that enhance the military principles of *See* first*, Understand* first*, Act* first, and *Finish* decisively could also be applicable to the requirements for emergency responders to *see*, *understand*, and *act* upon the situations that they face. Emergency responders require C4ISR capabilities that are similar to the Army's such as being able to operate in urban environments. Network-centric operations could be particularly valuable for responding to large-scale or multiple attacks and they could significantly enhance overall response capabilities by linking emergency responders on a national level and integrating them into a national system of systems.

Technologies The objective of S&T development for C4ISR is to enable a comprehensive awareness of current situations for network-centric operations. Several such technologies now being developed by the Army could be of use to emergency

responders. Among them are data fusion and decision support tools, network-centric communications including software-defined radio, and sensors including network sensor arrays. In addition, modeling and simulation, testing, logistics, and power generation capabilities being developed by the Army should have responder application. The Army and DHS should evaluate these systems and technologies for their potential to support interagency collaboration. In some cases, such as synthetic aperture radar (SAR), the Army should supply the capability rather than the technology.

Potential Collaboration between the Army and DHS There is considerable overlap of capabilities required by civilian emergency responders and the Army. As a result, the potential for collaboration between DHS and the Army is great. There should also be a formal process for transferring relevant technologies from DOD to state and local emergency responders. Six areas of opportunities for collaboration exist:

- *Technology transfer coordination* between DHS and the Army for sharing mutually beneficial technologies;
- *Systems engineering* to optimize C4ISR performance;
- The application of DOD *experimentation, testing, and review* assets to assist DHS where practical;
- Using Army capabilities to carry out *training programs* to assist DHS with critical training for emergency responders;
- Army assistance with DHS implementation of *network-centric operations* for emergency responders; and
- *Standardization efforts* to ensure better interoperability between DOD and emergency responder equipment.

The requirement for C4ISR is ever present for both the Army and emergency responders. Quick action by the Army can provide beneficial C4ISR solutions to DHS that will ensure a high level of interoperability.

Key Recommendations

The Department of the Army should carry out the following:

- **Work with DHS senior leadership to put in place a process for collaboration and sharing between the Army and DHS;**
- **Assist DHS to establish the RDT&E infrastructure to support the emergency responder community;**
- **Work with DHS to find common areas of science and technology collaboration; and**
- **Work with DHS to establish processes for joint operations.**

For further information

Copies of the complete report, *Science and Technology for Army Homeland Security—Report 2: C4ISR,* can be obtained on the National Academy Press Web site <www.nap.edu/catalog/ >**.**

Support for this project was provided by the Department of the Army. Any opinions, findings, conclusions, or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the sponsors. More information about the Board on Army Science and Technology can be found at <http://www7.nationalacademies.org/dmst>.

Committee on Army Science, and Technology for Homeland Defense

Liaison

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