



Federally Funded Research Strengthens National and Homeland Security

In an era of heightened security for our nation, it is more important than ever to invest in basic research and development in defense and security. Science and engineering research is the basis for many of the technologies currently being deployed to prevent, detect, and treat victims of chemical, biological, radiological, nuclear and conventional terrorist attacks. This research will serve as the “seed corn” from which future homeland security technologies will grow.

To date, many technologies that safeguard our nation have been developed through federal funding:

- Gamma-ray imaging was developed by physicists and astronomers doing basic research. It was improved using sensitive electronics and optics, and is now used to locate and identify radioactive materials. Applications include treaty verification, the prevention of nuclear materials smuggling, environmental cleanups, and medical imaging.
- Explosives, land mines, and illegal drugs can be detected with very high accuracy using quadrupole resonance spectroscopy, a technique similar to medical MRI.
- Supercomputer simulations use the physics of explosions to help in the process of safely disposing outmoded weapons.
- Night and all-weather vision systems amplify tiny amounts of light, and use liquid crystal and electroluminescent display technologies to transmit data without alerting the enemy.
- Sensor technology provides fast, cost-effective alternatives for detecting chemical and biological agents.
- Mathematical models have become important tools in the relevant planning for prevention and response, especially when combined with powerful, modern computer methods for analyzing and/or simulating the models. Mathematical modeling plays a crucial role in sensor location for detecting biological contaminants; identifying new “events” from large databases of text; identification of authors; and getting early warning of new disease threats.

Additional research is vital to safeguarding our nation and the federal government plays a critical role in funding this research.

Sources: American Institute of Physics, “Physics Success Story: Physics Protects People – National Defense,” www.aip.org/success; American Mathematical Society.