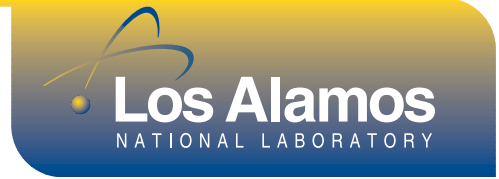# Information Analysis

Growing worldwide inventories of special nuclear materials, the technical simplicity involved in producing biological and chemical agents, the increased access to missile technology for delivery systems, and increases in regional strife all have contributed to the problem of proliferation of weapons of mass destruction. The problem is further complicated by the specter of subnational terrorists employing these weapons or of organized international criminals trafficking nuclear materials and nuclear weapons components. Information-based attacks on critical national infrastructures also are of increasing concern. Moreover, rapid advances on all technology fronts have increased the likelihood of a "technological surprise."
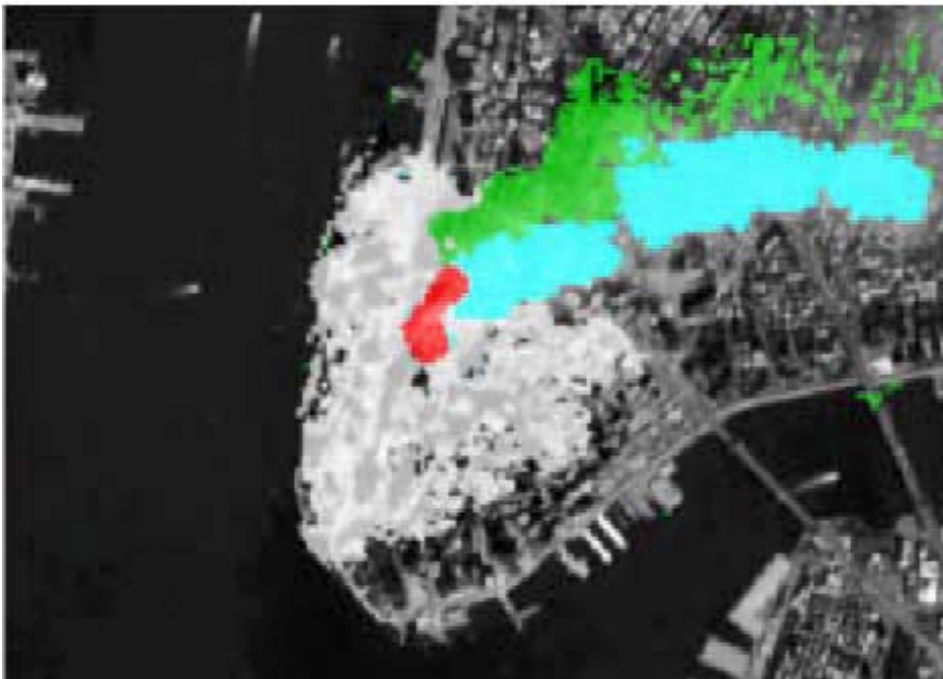
To guard against such happenings, Los Alamos, under the auspices of the Department of Energy's Office of Intelligence, continues to vigorously pursue a program that provides the U.S. intelligence community with technical assessments of these critical issues in support of national policy makers and creative technical solutions to otherwise "intractable" national security problems. International Technology projects at Los Alamos draw upon all-source intelligence data, the nuclear weapons expertise, and the multidisciplinary capabilities of the laboratory, which all combined provide intelligence analysis for the intelligence community. Los Alamos scientists provide technical estimates of foreign nuclear weapons, the related infrastructure, and the underlying science and technology base and capabilities, along with assessments of nuclear weapons technology, materials production, nuclear proliferation potential, and dual-use technologies, those valuable for both defense and peaceful pursuits.

Such projects tap into the interdisciplinary competencies at Los Alamos to develop specialized hardware and tailored application of existing capabilities in such fields as explosives, radio frequency detection, biotechnology, and information management.

The Laboratory's International Technology mission to deter, detect, and respond includes the following:

- Technical support to develop innovative options for mitigating new security threats.
- Assessments of the relative impact of arms control treaties on foreign nuclear weapons programs.
- Advanced computational and analysis capabilities that provide rapid assessment of options for responding to evolving threats, including the capability to model the consequences of those response actions.
- A range of credible, high-confidence methods for locating, characterizing, and disposing of weapons of mass destruction.
- Technologies that provide enhanced capabilities to commanders, special mission units, or law enforcement agencies.
- Access for the U.S. law enforcement community to appropriate Los Alamos technical capabilities to counter criminal activities and terrorism with real-time access to Laboratory resources to support on-site reaction teams.
- Intelligence-based evaluations of nuclear smuggling and illicit trafficking of nuclear technologies and materials.

Among the technologies finding a variety of important uses is the GENIE project, for Genetic Image Exploitation, a software algorithm, boosted with the POOKA advanced hardware. GENIE learns as it goes, analyzing any digitized imagery for the targets of choice. It can rapidly and intuitively develop algorithms for identifying features of interest and has been applied to many important problems including the analysis of the World Trade Center site multi-spectral infrared images to determine ash debris and smoke plumes for use in emergency response. Other uses for GENIE abound, with applications in environmental analysis, incident analysis, and nonproliferation support.

Feature-extraction algorithms (GENIE) were developed and applied to multispectral imagery of lower Manhattan post-Sept. 11. Here GENIE identifies not only the smoke plume from the terrorist attack, but also the chemical signature of the distributed dust in the debris field across Manhattan.

Los Alamos National Laboratory is operated by the University of California for the U.S. Department of Energy's National Nuclear Security Administration