



Engineering Sciences Section - 2013

C10 Large Area Hyperspectral Imaging of Effluents as an Example of Technology Transfer

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After attending this presentation, attendees will learn about an airborne Hyperspectral Imager (HSI) developed for the government and the efforts to transition this device into the law enforcement arena.

This presentation will impact the forensic science community by addressing how not all laboratories doing research into new instruments/methods that have forensic applications need to be certified and the scientists performing this research need not be accredited forensic investigators for their research to be acceptable in court.

This presentation will present an airborne HyperSpectral Imaging (HSI) sensor as an example of technology developed by The Aerospace Corporation, a California nonprofit company that operates a Federally Funded Research and Development Center (FFRDC), for the federal government and the effort to transition the device into a forensic tool. This technology was first demonstrated to law enforcement and public safety personnel using a small, ground-based instrument at a court-supervised methamphetamine cook in Southern California in 1998 by the National Law Enforcement and Corrections Technology Center – Western Region (NLECTC-WR). The NLECTC-WR was a National Institute of Justice (NIJ) center run by The Aerospace Corporation. The technology uses Thermal InfraRed (TIR) spectroscopy to detect and identify hazardous chemical effluents such as those created by methamphetamine labs (methyl ethyl ketone, Freon, etc.) and Improvised Explosive Devices (IED) production.

A predecessor of the current instrument was flown over the debris of the World Trade Center to locate hazardous materials, such as asbestos, ammonia, etc. The current instrument is greatly improved and can acquire data over much larger areas and process that data much faster than its predecessors. The current MAKO system capability will be described in detail as well as the path forward for this technology. The effort to transition this technology to forensic applications will also be put forth.

The airborne nature of the MAKO instrument is an expansion of the concept of crime scene boundary. The scientific examination of the 9/11 Twin Towers destruction expanded the concept of the crime scene boundary. It was based on an increased scientific capability. This expanded capability through translational science is the core message of this paper. The improved metrics and capability of improved technology are described as forensic advances in this paper.

Questions raised about the legal ramifications of this and other advanced technologies will be put forth and a path forward to get answers will be discussed.

In addition, the presentation will describe short- and long-term plans for utilizing this and other tools developed by the government for military applications as real-time forensic tools to systematically improve, on a volunteer basis, security, safety, and quality of life.

1. Integrate with the national agenda of All Hazards Preparedness. National preparedness is a quest.
2. Integrate with internationally available satellite systems, such as weather satellites and GPS, for accurate time and location of effluent events as well as their possible movements.
3. Develop synoptic displays applicable for first responders and non-scientific experts.
4. Develop concepts of operations for real-time forensics utilizing these tools.
5. Partner with law enforcement and public safety agencies to license/commercialize.
6. Provide training. Help the public differentiate fact from fiction.

Technologies, such as the HSI instrument presented here, will continue to be developed by institutions that are outside the realm of accredited forensic laboratories by scientists who are not accredited forensic technicians. There needs to be a method to transition these technologies into the forensic realm by proving their utility on actual casework and in the courts before the accreditation process can begin.

Hyperspectral, Imaging, Accreditation