



Engineering Sciences Section - 2012

C2 The Role of a Federally Funded Research Development Center (FFRDC) in Advancing Forensic Sciences

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After attending this presentation, attendees will learn the history of support and contribution to the engineering forensic sciences field by Aerospace Corporation personnel. The Aerospace Corporation (Aerospace) operates a Federally Funded Research and Development Center (FFRDC) that was chartered to support national security space (NSS) for over 50 years. This presentation will explain how the practical application of knowledge and experience derived from technically complex space-related problem solving has contributed specific evolutionary and revolutionary advances to support engineering and multijurisdictional forensic sciences.

This presentation will impact the forensic science community by highlighting how Aerospace will continue to play an important role in the development of new forensic procedures and investigation methodologies.

Because Aerospace is an engineering firm, much of the work is to protect and prevent as well as support case work and incident response. Specific examples of case-based technical support will illustrate the capability to work with criminalists and the potential to contribute expertise when the solution set requires specific knowledge, equipment, or instruments not resident in a mainstream, accredited forensic laboratory.

Aerospace has a history of support to the federal government in the fields of law enforcement and public safety. Aerospace personnel were involved in the re-investigation of the assassination of President Kennedy as well as other high profile cases. Methods for the recovery of the video from tapes that have been soaked in solvent and had parts melted have been developed. Aerospace developed one of the first “gunshot residue” tests and has contributed substantially to the “less than lethal” weapon and body armor fields. Methods for remotely detecting “drug cooks” have been developed and field-tested. This technology was used to support post 9/11 terrorist attack analyses. A hyperspectral instrument was flown over the site in an effort to confirm or refute the presence of asbestos in and around the wreckage area as well as the landfill where the debris was deposited. Because of Aerospace’s assistance in the investigation of launch failures, there are Subject Matter Experts (SME) in the fields of explosives and the damage to various materials caused by explosions. This includes metallurgical analysis of failed materials, electron microscopy, and x-ray analysis. Mass spectrometry analysis of bullet fragments has also been provided to various law enforcement agencies.

Aerospace ran a regional criminal justice technology support center that was operated for the DOJ. This center helped transition DOD technology to local agencies. Video tapes were processed by the Center’s Imagery Exploitation Facility, leading to several arrests. Audio evidence was processed to extract voices from noisy audio tapes, including difficult dialects and computer aided voice identification. These cases covered a wide spectrum of criminal activity, ranging from employee theft to child molestation to murder. Aerospace personnel also implemented a computer crime facility to assist law enforcement in recovering, enhancing, and evaluating computer information. This facility is used to decipher evidence from confiscated computers – evidence often thought to be unretrievable. In addition, Aerospace helped develop GPS for the Air Force. This space based technology, small enough to be hidden, provides pin-point accuracy in tracking.

This support continues with the development of expertise in real-time forensics. Real-time forensics is a new field where rapid analyses support in-real-time situational awareness enables multijurisdictional decision making in excessively costly or life-and-death situations. This is becoming especially important in the area of Improvised Explosive Devices (IED)—both in their detection and their handling.

A proactive approach to real-time engineering forensics will be put forth. Combining real-time forensics with emerging concepts, and based upon lessons learned, will advance the capability to develop site-specific safety and security features that facilitate post-event response, recovery, and evidence collection, as well as to deter crime.

The presentation will conclude with a delineation of the path forward for using Aerospace’s technical and process capability in alignment with recommendations of the National Academy of Sciences.¹

Reference:

- ¹. “Strengthening Forensic Science in the United States: A Path Forward,” Committee on Identifying the Needs of the Forensic Sciences Community, National Research Council, 2009, ISBN 0-309-13135-9.

Space Related Problem Solving, Rapid Analysis, Real Time Forensics