OSAC 2023-N-0001 Standard Practice for Training in the Areas of Video Analysis, Image Analysis, and Photography

Video/Imaging Technology and Analysis Subcommittee
Digital/Multimedia Scientific Area Committee (SAC)
Organization of Scientific Area Committees (OSAC) for Forensic Science

Draft OSAC Proposed Standard

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Standard Practice for Training in the Areas of Video Analysis, Image Analysis, and Photography

This standard is issued under the fixed designation X XXXX; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (∑) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice describes the minimum criteria for training-to-competency programs in technical topics related to the disciplines of forensic video analysis, image analysis, and photography to satisfy Section 5.2 of Practice E2917. These requirements apply to forensic photographers and to forensic image and video practitioners.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards*:

E2916 Terminology for Digital and Multimedia Evidence Examination

E2917 Practice for Forensic Scientist Practitioner Training, Continuing Education, and Professional Development Programs

2.2 *SWGDE Guidelines*:

SWGDE Training Guidelines for Video Analysis, Image Analysis and Photography Version: 1.1(February 8, 2016)

3. Significance and Use

3.1 With the proliferation of electronic devices (e.g., computers, cell phones, security cameras), it is difficult to imagine a crime that could not potentially involve digital images or video. Due to the prevalence of multimedia evidence, training is necessary in the areas of video analysis, image analysis, and photography.

3.2 Training topics introduced in this document may not fit the needs of individual organizations, when job-specific duties are limited to a subset of those listed. Each organization should determine the minimum training guidelines for examinations performed.

3.3 Training can quickly become obsolete, and continuing education is needed to maintain proficiency.

3.4 Additional training may be needed for new technologies and procedures that are not included in this document.

3.5 Refer to additional standards and guidelines for discipline specific guidance that requires the use of video analysis, image analysis and photography.

4. Training-to-Competency Programs

4.1 Video analysis, image analysis, and photography play fundamental roles in the investigation and prosecution of crimes. The collection, preservation, examination, and analysis of video and images require a foundation in the practical application of image science, photography, image and video technology, and the law. Because of the paucity of degree or certificate programs in multimedia forensic analysis, practitioners have historically relied on practical training through law enforcement or vendor-specific programs or both. A forensic practitioner of image and video analysis or photography should be capable of integrating their knowledge, skills, and abilities in the identification, preservation, documentation, examination, analysis, interpretation, reporting, and testimony.

4.2 As in all forensic disciplines, a combination of personal, technical, and professional criteria will influence a prospective video or image analysis or photography practitioner's suitability for employment. New employees may be hired provisionally or go through a probationary period that requires successful completion of additional training or competency testing or both as a prerequisite for continued employment.

4.3 Training program content should be designed to include core elements for each role.

4.3.1 Policy

4.3.1.1 Organization of the laboratory

4.3.1.2 Handling of samples and evidentiary material

4.3.1.3 Handling of services and supplies

4.3.1.4 Dealing with clients, requests, and complaints

4.3.1.5 Laboratory information management system (LIMS)

4.3.1.6 Case review process

4.3.1.7 Audits and assessments

4.3.1.8 Proficiency testing process

4.3.2 Legal Issues:

4.3.2.1 Specific legal requirements to include admissibility issues (e.g., Daubert v. Merrell Dow Pharmaceuticals (1993), Frye v. United States (1923), Federal Rules of Evidence (Rules 701-706), etc.)

4.3.2.2 Overview of the criminal justice system

4.3.2.3 Courtroom testimony

4.3.2.4 Moot court exercises, including admissibility issues (e.g., Daubert v. Merrell Dow Pharmaceuticals (1993), Frye v. United States (1923), Federal Rules of Evidence (Rules 701-706), etc.)

4.3.2.5 Testimony monitoring

4.3.3 Human factors relating to forming opinions in analysis (e.g., cognitive bias)

4.3.4 Discipline-specific topic areas in the training program should include the following:

4.3.4.1 Forensic image and video analysis practitioners and photographers shall understand the basic principles of digital multimedia evidence handling to include integrity of the media, metadata, file structure, and reporting as required by the Forensic Science Service Provider (FSSP).

- Multimedia management – knowledge of procedures to protect the security and the integrity of images

- Multimedia file types – understand the various image file types and when to use (e.g., jpg, RAW, tif, mp4, avi, mov, heic)
- Metadata/EXIF data - understand characteristics of the metadata and how it can be modified through distribution
- File structure - understand characteristics of the file structure such as header and footer signature, file hash-identification, and how it can be modified

4.3.4.2 Forensic photographers, to include crime scene and laboratory photographers, shall understand basic photography concepts as well as the function and use of cameras used by the FSSP. As training may not be necessary in all areas, a training program may be customized for the types of evidence a photographer will encounter.

- Knowledge of camera equipment – cameras, lenses, filters, flashes, or other lighting
- Knowledge of camera operations – date and time settings, image file settings, adjustment of ISO, shutter speed, aperture, white balance, manual and auto focus, stabilization, lens types, metering modes, and the use of various flash units
- Knowledge of photography concepts - exposure, depth of field, distortion, and composition
- General scene documentation – ability to photograph overall, medium, and close-range photographs
- Examination documentation – properly document impressions, friction ridge evidence, blood spatter, and other pattern evidence
- Subject photography (living and deceased persons) – documentation of subjects, to include scars, marks, and tattoos
- Photography of vehicles – documentation of the interior and exterior conditions of the vehicle, any associated evidence in or around the vehicle, and the vehicle's location
- Knowledge of various lighting techniques for proper documentation of evidence
- Specialized photography (e.g., trajectory, aerial photography, panoramic photography, blood stain patterns, chemiluminescence (e.g., Bluestar®, luminol), photomicrography, full spectrum photography (e.g., UV/IR and fluorescence) and techniques related to other forensic disciplines) (as necessary)
- Image processing – understand the various basic and advanced techniques used to process images and their limitations

4.3.4.3 Forensic practitioners specializing in image analysis shall understand the basic engineering and scientific principles associated with imaging systems which include

imaging physics, photographic science, human vision and perception, image capture and display technologies (both analog and digital), and digital image processing.

- Image comparison theory – the background of image comparisons and the significance of features depicted in questioned or known objects or images, as they relate to forming an opinion regarding source determination.
- Photogrammetry theory – methods of measuring objects in photographs with accuracy
- Imaging artifacts – features and characteristics introduced through image systems and processing (e.g., compression)
- Advanced image processing techniques – methods to improve clarity of details pertaining to aspects of an image's recorded content
- Content authenticity – methods to determine if content has been altered.
- Source authenticity – methods to determine if the provenance of data has been altered
- Signal analysis – methods to determine how signals influence or may be captured in image
- Specific domain knowledge for content analysis and comparison
- Knowledge of methodology for comparative analysis - ACE-V, a method which entails the analysis, comparison, evaluation, and verification of comparative examinations
- Statistics and probability
- Evaluation of measurement of uncertainty

4.3.4.4 In addition to the criteria outlined above for image analysis practitioners, forensic practitioners specializing in video analysis shall understand video technology fundamentals such as image science, audio principles, video theory and the acquisition, assessment, processing, and analysis of video evidence.

- Data acquisition - properly recognize, protect, and collect data from DVR systems and cloud-based platforms
- Data assessment - examination suitability, file attributes, determination of the regions of interest, and the preparation of a working copy to be used during an examination
- Knowledge of video analysis tools - hardware and software, including the ability to research, evaluate, and properly use third party software and codecs
- Knowledge of processing methods - transcoding, enhancement, restoration, basic byte level analysis, and timeline sequence reconstruction

- Knowledge of analysis methods - includes image analysis principles listed above

5. Keywords

5.1 Education; experience; professional development; qualifications; video analysis; image analysis; photography; training