Scientific Working Group on Digital Evidence

SWGDE Photographic Equipment and Infrastructure Recommendations

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Table of Contents

1. Introduction

The purpose of this document is to provide guidance and recommendations for equipment, infrastructure, training, Standard Operating Procedure (SOP) development, and the security and integrity issues for photography in the forensic environment.

This document addresses the photographic documentation of events and/or subjects that are in the field, forensic laboratory, studio, or other controlled environment.

2. General Equipment Considerations

Equipment needs depend on the tasks performed and the intended use of the image. Evaluation of all equipment used to capture imagery should occur prior to use to ensure the equipment meets the need of the task performed and the intended use of the image.

Agencies should identify specific camera requirements such as lenses, resolution, color fidelity, exposure capability, dynamic range, durability, file formats, and storage. For example, crime scene technicians should use a camera that is capable of manual settings and has interchangeable lenses, off-camera flash, and a tripod mount. A good quality point-and-shoot camera or an electronic device with good quality integrated camera capabilities may be sufficient for first responders.

The agency should have a specific mechanism for determining whether a piece of hardware meets requirements. Some applications, such as impression evidence, have specific quantitative and qualitative requirements regarding equipment or resolution (see SWGIT documents “General Guidelines for Capturing Latent Impressions Using a Digital Camera”, “General Guidelines for Photographing Footwear and Tire Impressions”). Specification sheets may be used as a guide, but in most cases it will be necessary to test the equipment under operational conditions.

Equipment acquisition and SOPs should ensure that field personnel are provided with adequate consumables (i.e. batteries, removable storage media) and accessories (i.e. flash, tripods). In addition, adequate physical storage and protection of equipment and media is necessary to maintain operations.

3. Infrastructure

Infrastructure refers to both hardware and software necessary to store, secure, process, transmit and output data. Creating and maintaining a sound infrastructure requires developing a needs assessment, validating, verifying, maintaining, and upgrading the systems. Inadequate infrastructure will undermine the ability to secure and efficiently utilize the images.

3.1 Needs assessment

An agency should perform a needs assessment to determine what infrastructure is necessary for its specific tasks and demonstrates how it plans to fulfill those obligations. This assessment identifies what tasks are to be performed, under what circumstances those tasks will be performed, and the end use of the imagery. Specific hardware, software, and training requirements can be targeted to tasks, circumstances, and end uses.

An important aspect to consider is image output. Output of images refers to display devices, printers, and/or optical media. The end use of an image determines the appropriate output method. For example, the hardware requirements will differ significantly between images that are to be analyzed on an 8 x 10" print versus those that will be viewed with a projector or monitor.

3.2 Validation and Verification

Validation is a necessary part of infrastructure design and usage. The degree and type of validation should be reasonably targeted to the context within which the assets will be used; it is not necessary to validate functions or capabilities that will not be used. Verification that assets are functioning appropriately (sometimes called quality-control tests) should be an integral part of any SOP, and must be conducted before the asset is put into use. If the asset has been repaired or taken out of service, verification that it is functioning appropriately must be conducted before use. The frequency and degree of verification may be application and agency-specific.

3.3 Maintenance

Agencies should plan for and adopt strategies and responsibilities for preventive maintenance, repair, and inspection of hardware and software to maintain optimum performance and to prevent catastrophic failure.

3.4 Lifecycle

Infrastructure assets, particularly in a high-technology area such as imaging, are subject to wear, tear, and obsolescence. Equipment used will be subject to physical stress and will eventually require repair or replacement. Other assets, such as rechargeable batteries, have a finite lifespan. Technology advances quickly, and newer, less expensive hardware/software may provide better results at a lower operational cost. New technologies may allow expansion of service opportunities or provide capabilities that were previously not available. Agencies should periodically assess their needs and determine if new technologies or upgrades are warranted.

4. Training

A training program is essential for successful image acquisition, processing, and output of images. Training programs should be designed and implemented to provide the skills and knowledge required to successfully perform at an appropriate level of responsibility. See SWGDE document "SWGDE Training Guidelines for Video Analysis, Image Analysis and Photography."

5. SOP Development

SOPs are agency-specific and are important to provide structure, guidance, and to ensure consistency. See the SWGDE document "SWGDE Model SOP for Computer Forensics," as an example.

6. Integrity and Security of Images

Integrity ensures that the original image is available in its unaltered form. Security is imperative to maintain integrity, which includes protection of portable data storage devices, computer facilities, and data stored and/or transmitted on computer systems. It involves the use of management, personnel, and operational and technical controls. Refer to SWGIT Document "Best Practices for Maintaining the Integrity of Digital Images and Digital Video."

7. Categories of Photography

Photography generally falls into two different categories depending on the extent of documentation required. Each category will require different levels of training, knowledge, experience, and equipment.

7.1 General photography

- Requires basic knowledge of camera operation and photographic composition
- May allow automated camera settings
- Utilized for documentation purposes
- Images should be captured at the highest available resolution and the least amount of compression (e.g. high, fine)

7.2 Advanced photography

- Requires knowledge of manual exposure control, flash photography and other lighting controls, alternative light sources, use of tripods and remote shutter releases, filters, and other accessories
- Requires the use of a Digital Single Lens Reflex (DSLR) camera with manual settings, interchangeable lenses, and off-camera flash capabilities
- Utilized for documentation for comparative analysis, such as with latent fingerprints and other impression evidence
- Images that will undergo analysis should be captured at the highest available resolution with either no compression or lossless compression

Note: SWGDE document "SWGDE Digital Image Compression and File Formats Guidelines" contains information to assist in developing the appropriate application of file formats and compression algorithms.

In addition to general or advanced photographic knowledge, there are specialized applications that require additional training based upon specific needs, such as with aerial, surveillance, arson, or hazardous materials (HAZMAT) photography.

Example of General Photography – First Responder

First responders are frequently called upon to document conditions they find at an incident where a crime scene photography unit or specialist may not be requested or available. Examples may

include: domestic violence incidents, traffic accidents, minor property crimes, and other incidents as defined by agency-specific policies. Photography may not be the first responder's primary responsibility and they may have general photography training. The first responder must be cognizant that the images captured may contain important information that was not recognized at the time the photograph was taken. Unless first responders are trained in advanced photography techniques and have the equipment necessary for comparison and analysis, it is advised that they do not photograph these types of evidence.

Equipment for First Responder Photography:

- A camera with flash, close-up capability, and can capture images with the necessary resolution needed to utilize the image.
- Other standard photographic equipment, such as off-camera flash or scales, can be utilized when required
- Videography, when used, should be in a supplementary capacity
    - Consideration should be given as to whether audio is used
- Agencies should designate the circumstances in which first responders should photograph and the circumstances that should prompt a request for individuals with advanced photographic training

Example of Advanced Photography – Crime Scene Photography

Crime scene photography is directed towards documenting evidence and other details of a crime scene in a true and accurate manner. Including, but not limited to, accurately representing details and colors; capturing overall, intermediate, close-up, and examination images with accurate spatial relationships; comparison images; and contending with varying lighting and physical conditions.

Crime scene photography is usually a time-sensitive activity with only one opportunity to document the evidence and other details of the crime scene. Depending on the nature of the crime or incident, conditions at a crime scene may require the use of a variety of equipment and techniques.

Equipment for Crime Scene Photography:

- A DSLR camera that is capable of manual settings, with interchangeable lenses, off-camera flash, remote shutter release, and a tripod mount
- The camera settings must allow for the necessary resolution needed to utilize the image. General documentation images may not need as high of resolution as analysis quality images
- Cameras should be set to either uncompressed or lowest compression (highest quality format or fewest numbers of pictures per media card)
- Other standard equipment may include:
    - External battery packs

  - Sturdy tripod
  - Additional removable media
  - Gray card and/or color checker
  - Various types of known scales
  - Various types of filters
  - External flashes and cords
  - Remote shutter release
  - Light meter
  - Various types of lenses (macro, normal, wide-angle, telephoto)
- Videography, when used, should be in a supplementary capacity
  - Consideration should be given as to whether audio is recorded

Example of Photography Utilizing Special Applications – Surveillance Photography

Surveillance photography documents events and individuals engaged in acts as they occur. Surveillance activities may involve highly specialized techniques and equipment that require technical training and knowledge and are best accomplished by trained specialists.

Equipment for Surveillance Photography:

- A DSLR camera that is capable of manual settings, with interchangeable lenses, remote shutter release, and a tripod mount
  - The camera settings must allow for the necessary resolution needed to utilize the image. General documentation images may not need as high of resolution as analysis quality images
  - Cameras should be set to either uncompressed or lowest compression (highest quality format or fewest numbers of pictures per media card)
  - The ability to disable the flash, display screen and infrared auto-focus transmitter as well as any other features that would assist operational security. In covert surveillance situations, illumination of the photographer by the LCD screen may compromise safety.
- Other photographic equipment depending on operational necessity
- Specialized equipment, which may include night vision or thermal imaging equipment
- Videography can be used as the primary method or in a supplementary capacity
  - Consideration should be given as to whether audio is recorded

The successful capture of images sufficient for identification of depicted individuals and/or objects (e.g. license plates) will require close attention to the selection and appropriate use of equipment.

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History

Revision	Issue Date	Section	History
1.0 DRAFT	2016-09-15	All	Initial draft created and SWGDE voted to release as a Draft for Public Comment.
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1.0	2017-01-12	3.2	Sentence added to expand on verification requirements if a device has been repaired. SWGDE voted to publish as an Approved document (Version 1.0).
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