

# TRANSPORTATION SECURITY LABORATORY

## Simulant Verification and Validation



**Homeland  
Security**

Science and Technology

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# Conclusions (So What?)

- Proliferation of Homemade Explosives (HMEs) continues to drive need for simulants to support security technology development, test and training.
  - HMEs are expensive and dangerous to synthesize and test
  - HMEs cannot be put on humans for AIT testing
- Possible courses of action for training and testing
  - Use all live threats but limited number of images
  - Use all simulants for training and testing
  - Combination of limited live threat data and simulants (most likely scenario)
- How do we ensure simulant validity for stakeholders?
  - Possible solution: Blind comparisons conducted between Government and Industry to refine V&V process

# Motivation and Problem Statement

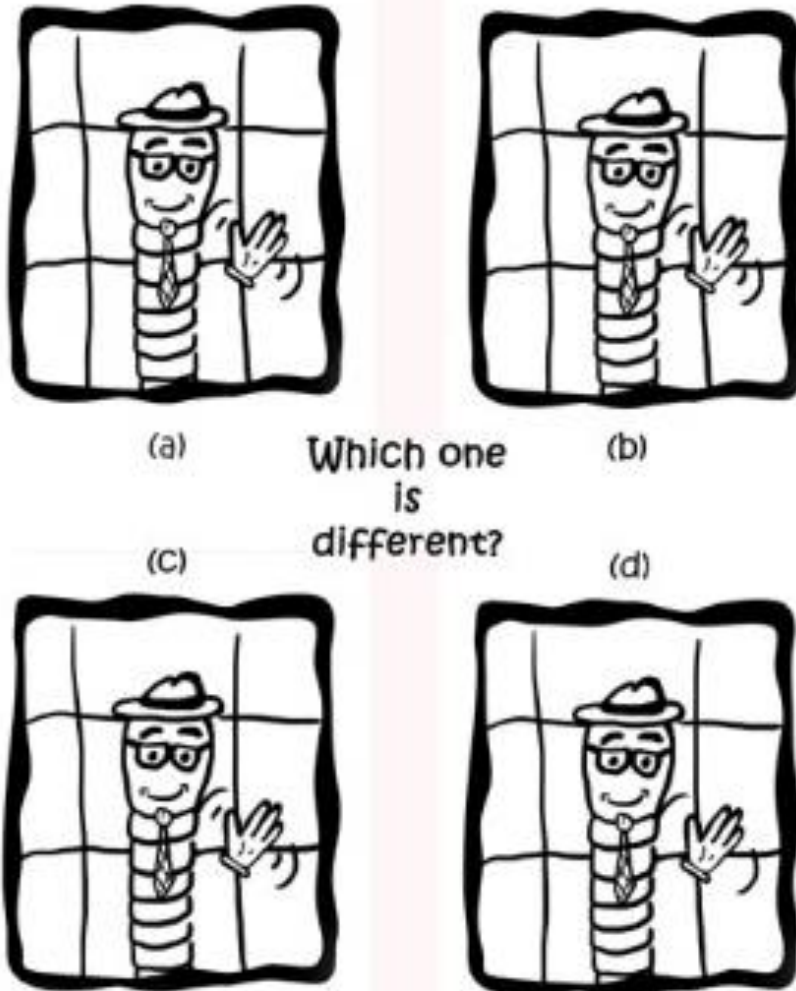
- The Mission Needs for the Simulant Accreditation Program was established by a multi-agency panel (Fall 2015) to serve the need for a unified approach to Simulant V&V.
- DHS/S&T/HSARPA/EXD is funding development of a simulant verification and validation accreditation process
- Verification – did we make it right?
  - What is the feature set needed?
  - What should the tolerances be on matching those features?
- Validation – did we make the right thing?
  - Is the simulant suitable for its intended use?
  - Answer depends on end user and application
- Defining texture is a significant issue to be addressed

# V&V Implementation Concerns

- Defining the feature space
  - Regions of responsibility define very limited feature space
  - Vendors use some common features for material discrimination
  - Unique (proprietary) features applied as well
- What is a meaningful difference?
  - How close do two measurements of a feature have to be to be considered equivalent
  - Does the closeness of two measurements of one feature affect how close a pair of measurements of another feature need to be?
- How can vendors share information without disclosing proprietary features and methods?

# Blind Analysis of Candidate Simulants

- Provide industry with unlabeled candidate simulant and explosive images.
- Can industry tell the difference (up to what confidence level)?
- If they can, provide Government with structured feedback to improve design characteristics.



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