NIST LATENT TESTING WORKSHOP

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LATENT PRINT EXAMINATIONS

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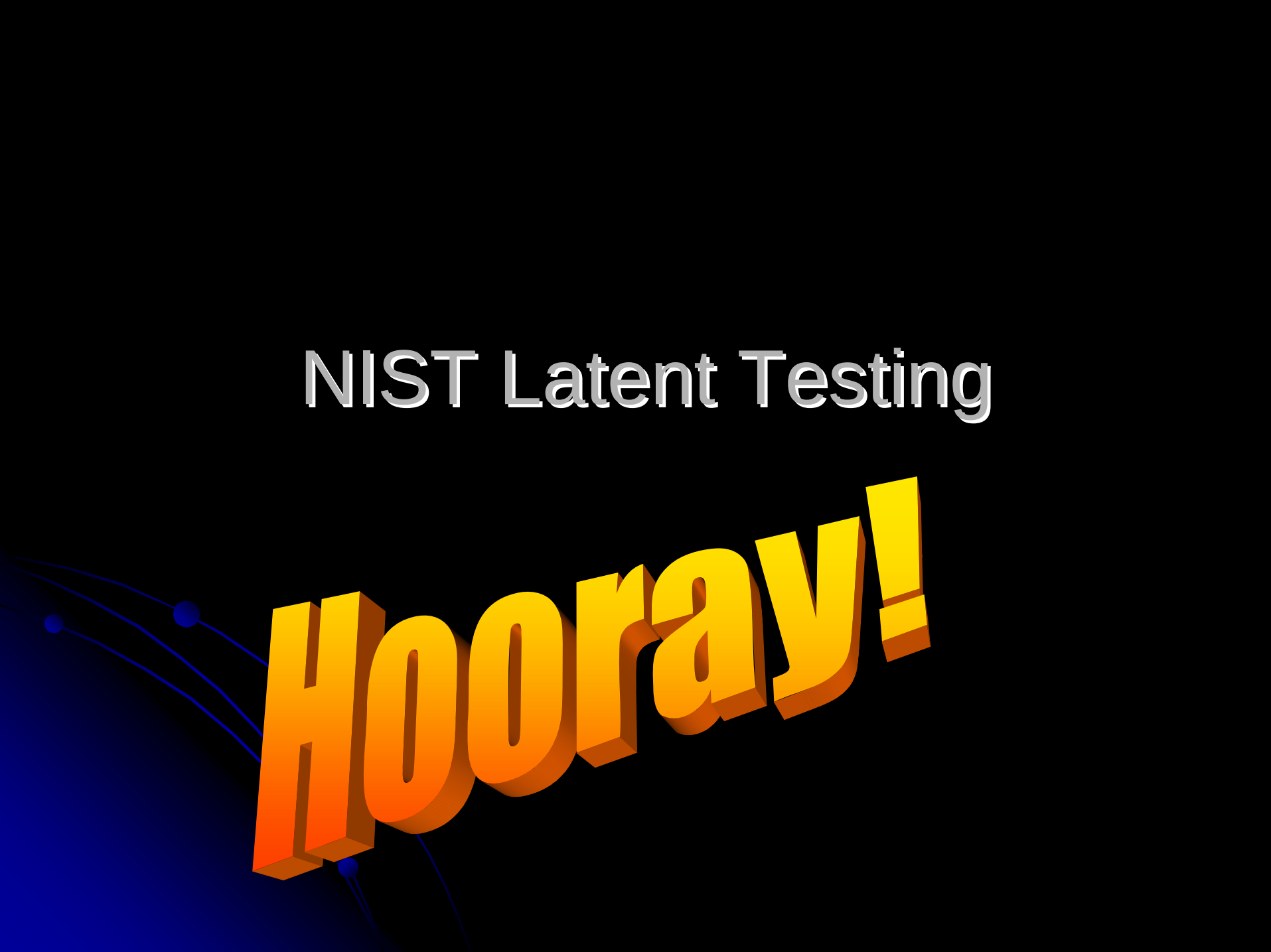
NIST Latent Testing



The Benefits

- More individuals identified…
- More information in support of criminal investigations…

- More perpetrators identified…
- More cases solved…

- More information in support of intelligence investigations…
- More crimes prevented…

- More persons processed thru security checks…

- QUICKER

NIST Latent Testing

- What is our scope?
- What is our objective?
- What is our focus?
- What are our assumptions?
- What are our limitations?

THE (starting) SCENARIOS

- **1. Starts at the crime scene with investigators (non-latent print examiners)**
  - Without remote AFIS capability
  - With remote AFIS capability
- **2. Starts at the crime scene with latent print examiners**
  - Without remote AFIS capability
  - With remote AFIS capability
- **3. Starts at the laboratory with latent print examiner**
  - Starts at AFIS evaluation phase

THE (starting) SCENARIOS

- 4. Biometric application for security check processing.
  - No latent examiner available
  - Latent examiner available
- 5. Large volume cold case filtering.
  - Large number of cases backlogged?
  - Large number of latent prints in a case?

THE (ending) SCENARIOS

- 1. At the crime scene with investigators (non-latent print examiners)
  - AFIS latent lights-out; who makes the ultimate decision (based on what) to arrest/apprehend or take another course of action - ?
  - Verification ?
  - Bias related issues
  - Who testifies, to what, in court?
- 2. At the crime scene with latent print examiners
  - AFIS latent lights-out
  - AFIS latent with assist
  - Verification ?
  - Bias related issues

THE (ending) SCENARIOS

- 3. At the biometric check station
  - Immediate action?
  - Secondary processing?
  - Investigative / intelligence lead?
- 4. Latent case load management filtering
  - Which cases to place manpower towards?
  - Which latent prints to focus on first?

The Potential

- Use AFIS latent “lights-out” for performing decision with latent prints and elimination prints, suspect prints?
  - How well will this work for direct comparisons instead of searching a large repository?
- Is this a general probability statement algorithm for any latent print comparison?
- What about latent print exclusions?
  - Are we only including what makes an “ident”?
  - Or, will we also include the exclusion (“non-ident”)?

NIST Latent Testing Workshop - Maintaining a Perspective -

- Name of the Test
  - NIST Latent Testing
  - NIST AFIS Latent Testing
- Define “lights-out”
  - Input only
  - Input and search (parameters)
  - Input, search and conclusion
  - Input, search, conclusion, and verification
- Define “quality”
  - “AFIS latent quality” versus “Case latent quality”

NIST Latent Testing Workshop - Scope for Testing -

- Latent Prints…
  - From corresponding area of a rolled 10-print?
  - From corresponding area of a flat impression?
  - From the extreme finger tip areas?
  - From the finger lower joints?
  - From the palm prints?
  - From the extreme sides of the palms

NIST Latent Testing Workshop - Scope for Testing -

- Latent prints vs. 10-print records
- Latent prints vs. less than 10-print records
- Latent prints vs. Unsolved latent prints
- Latent prints vs. palm prints
- Latent prints vs. Complete Friction Ridge Exemplars (old major case prints)

NIST Latent Testing Workshop - Scope for Testing -

- Filtering
  - Latent print classification?
  - Latent print orientation?
    - Upright; degree of rotation tolerance
  - Latent print area correspondence?
    - Left delta, above core, etc.
  - Latent print finger designator?
    - E.g. definitely impression from right thumb
  - Physical descriptors?
  - Geographical limitations?

NIST Latent Testing Workshop - Scope for Testing -

- Statistical significance
  - How many samples (latent prints)?
  - How large of a repository?
  - And all of the other issues needed to determine reliability / confidence in results.

Big Picture

- Need to design these tests to answer the technical questions, as well as maintain perspective to the operational and judicial issues.

Let's go for it!

Image Acquisition

- Quality
  - Both latent prints and known exemplars
  - Capture resolution / compression
  - Automatic image enhancement
- Distortions
  - Automatic adjustments
- Processing techniques
  - Light sources
- Biometric scanners

Feature Extraction

- L1D
  - Classification, orientation, finger position
- L2D
  - Minutiae (type 9 record)
  - Extended feature set
- L3D
  - Extended feature set

Test Sets

- NIST Special DB 27
- FBI special purpose data bases being created for specific latent print research purposes (Daubert related)
  - Black Box Study
  - Simultaneous impressions
  - Quality metrics
  - Quantity metrics
  - Extended Features
- Need for close non-mates

Test Sets

- Controlled test sets vs. case work
- Multiple test sets:
  - Initial proof of concept test sets
  - Test sets
  - Validation test sets
- Increase range of image quality (good, bad and ugly needs extended)
  - No value for comparison
  - No value for identification, but good for exclusion
  - No value for ‘traditional AFIS’ searching
  - Equivalent to high quality known exemplar

Test Sets

- Known exemplars
  - Sufficient (duplicate) samples from various recording techniques
    - Ink
    - Live-scan
      - Various resolutions / compressions
      - Various technologies
    - ?
  - Controlled qualitative aspects
    - Acquisition or post-processing

Test Sets

- Human subject volunteers
  - All of the issues that come along with this requirement.

Conclusion

- It is time to commit to do this.
- Latent print performance gains have huge potential.
- Understand consequences to operational and judicial processes.