Adding 3D Fingerprints to the Standard

William F. Long, PhD

COO, TBS North America, Inc.

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Disclaimer

This presentation is based on non-proprietary data. It reflects the views of the author. Neither TBS North America nor any other party has necessarily adopted these views.

The Promise of 3D

- Elimination of Distortions Caused by Skin Elasticity and Pressure
  - Level 3
    - Ridge Path
    - Ridge Width
    - Ridge Shape
    - Incipient Ridges
    - Sweat Pore Existence

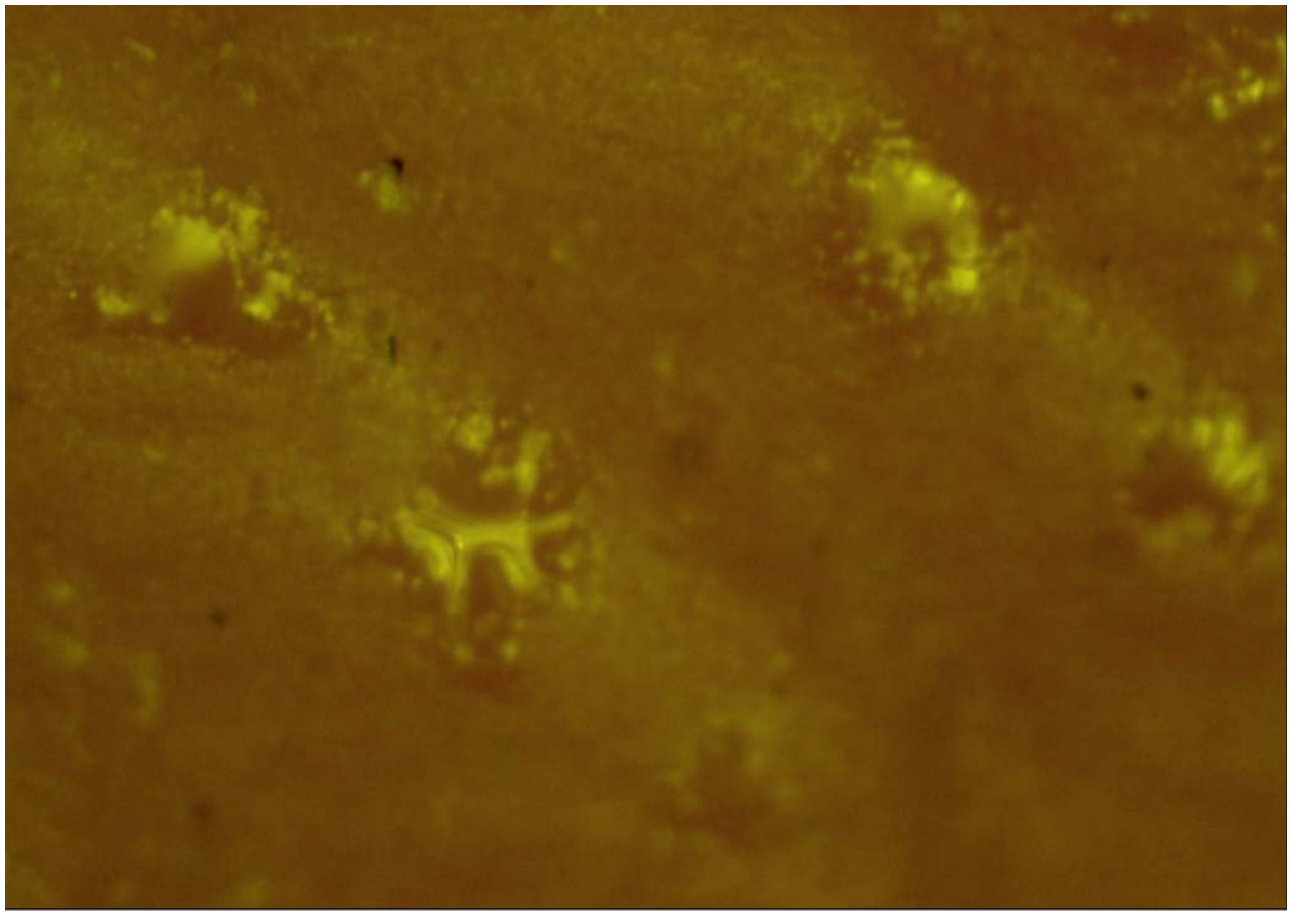
The Promise of 3D Levels 4 and 5

- Steve Meagher's small comment about the possibility of Levels 4 & 5, what could it mean?
  - Ridge Slope?
    - LumenIQ technology
    - TBS technology
  - Sweat Pore Shape?
  - Sweat Pore Activity?

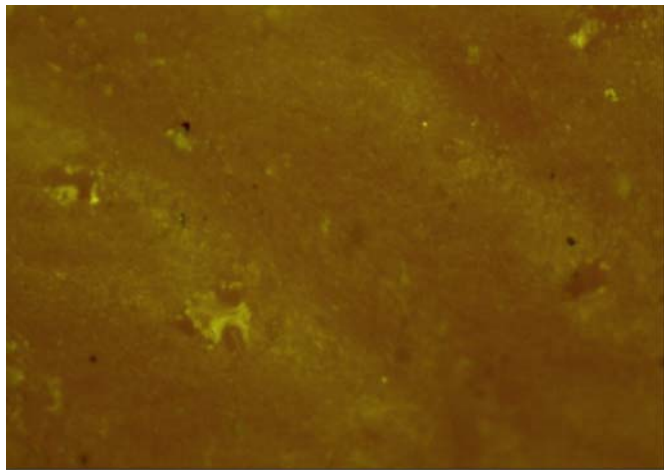
The Promise of 3D Ridge Shape

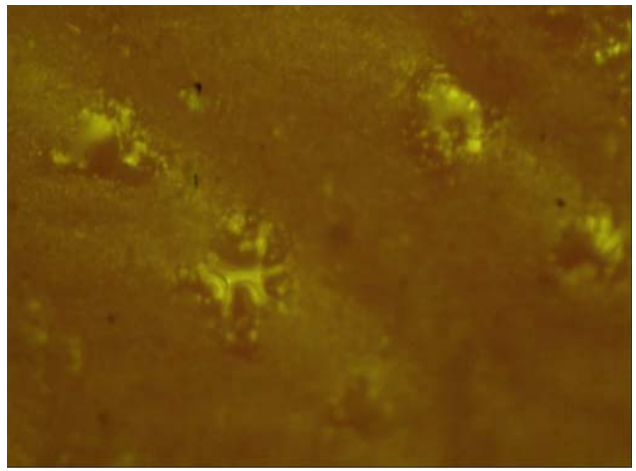
- What is there?
  - Full 256 grey scale, rather than 2 shades with some fuzziness at the edges
  - Results of possible texture variations: ridge, valley, slope
  - Results of illumination
    - Intensity
    - Direction
    - Color

The Promise of 3D Sweat Pore Shape



The Promise of 3D Sweat Pore Activity





The Promise of 3D Resolution Issues

- Slides 5 & 6
  - Extracted from a video with effective resolution of about 8000 ppi
  - 11 second run
  - 95 MB
- Any hope for 3D images taken at reasonable resolution?

The Promise of 3D
1000 ppi Images (1)

The Promise of 3D
1000 ppi Images (2)

- What is in the image? Note: not 3D, touchless flat, close to 3D
  - From TBS
  - Sweat Pores
    - Different stages in the sweating cycle?
      - Closed (not visible?)
      - Opening
      - Sweating
      - Closing
  - Sweat Droplets?
    - Maybe, but might be dirt. We are working on it.

The Promise of 3D 1000 ppi Images (3)

- Simple observations on livescan (not scientific yet)
  - Pore sweats, droplet fills in pore, pressure shows complete contact: no pore
  - Pore is on the side, or maybe even in the valley, no contact with platen: no pore
  - Pore is closed, so orifice is small: possibly no pore

The Uses of 3D

- Forensics, Especially Latent Examination
  - See ‘Fingerprint 3rd Level Details Discussion’
  - More data rather than less
- Liveness Testing
  - Dynamic Photography Possibilities
    - Slide 7
  - Static Photography Possibilities
    - Slide 9

Market Presentation of 3D Images

- LumenIQ – clever work with 2D images
- TBS
  - Surround Imager
    - A few months to first distribution of a small number of devices
  - Touchless Sweep Sensor
    - NIJ Fast Capture Rolled Equivalent Grant
- Carnegie Mellon & University of Kentucky
    - NIJ Fast Capture Rolled Equivalent Grant

Data to Report (1)

- Standard descriptive material
- Images
  - 3D. Use OpenGL to describe the image. Place in dedicated field.
  - 2D
    - Rolled equivalent. Separate field for this.
    - Flat equivalent.
      - Might just use crop of rolled equivalent
      - Might need in addition to rolled equivalent

Data to Report (2)

- Consistency with MedX3D?
  - Finger as a body part
  - Skin as an organ
  - Epidermis, dermis – more fields?
  - Sub-dermal – more fields?
    - Vein pattern
    - Sub-dermal structure beyond veins

Data to Report (3)

- Models to use
  - Appendix N
  - Other Type 14 implementations for fingerprints
  - A totally new type – possibly
    - Signal that this is a new and different finger image type
    - More work, but more definitive information, not so dependent on end user understanding nuances

Recommendations

- Adopt 3D reporting
- Charge ad hoc committee with provision of specific Type details
  - Short time frame
  - All relevant parties, invited to participate
    - Developers
    - Users
  - Coordinate with MedX3D