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# Biometric Basics

Presented by

Department of Defense Biometrics

DoD Biometrics Management Office

DoD Biometrics Fusion Center

*PKI PKE Forum*

New Orleans, LA

14-18 June, 2004

[www.biometrics.dod.mil](http://www.biometrics.dod.mil)



## Purpose of Briefing

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**To provide an introduction to biometrics**



## What Are Biometrics?

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**Biometrics** are measurable physical characteristics or personal behavioral traits used to recognize the identity, or verify the claimed identity of an individual.





# Legacy Security Measures vs. Biometrics

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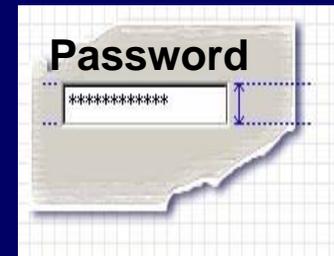
## Something you have:

- Key
- Card or badge
- Printed combination or codeword
- Name on uniform



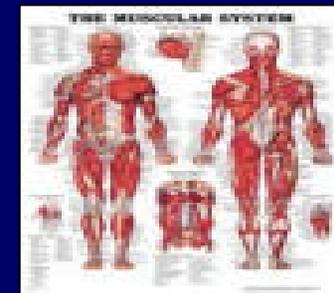
## Something you know:

- Memorized password
- Memorized password or PIN
- Memorized combination



## Something you are:

- Biometrics





# Security Risks Mitigated by Biometrics

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## Insider Threat

- Increase individual user accountability
- Audit trail mechanisms provide an irrefutable record of user actions on a system

## Fraud – Prevent unauthorized access

## Weak PIN, Password, and Token Management

- Decrease number of PINs and passwords per user
- Allow stronger security measures for remaining PINs and passwords

## Terrorism

- Control physical access
- Identify persons of interest



# Types of Biometric Matching

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## Identification Mode: 1:many

- Example 1: Paratrooper boarding an aircraft is checked against a manifest of fingerprint records (templates) of authorized jumpers
- Example 2: Detainee presents fingerprints, which are matched against U.S. Government database

## Verification Mode: 1:1

- Example 1: Airman uses PIN, then hand geometry to enter Scott AFB from the train station. PIN acts as pointer to biometric record (template)
- Example 2: Soldier logging onto network selects his username, is then asked to present iris for scanning. Username acts as pointer to the stored template.

**The majority of biometric applications are 'Verification' using a claimed identity**



# The Biometric Enrollment Process

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Live Model  
Presentation

Digitization

Template  
Extraction

Template  
Classification

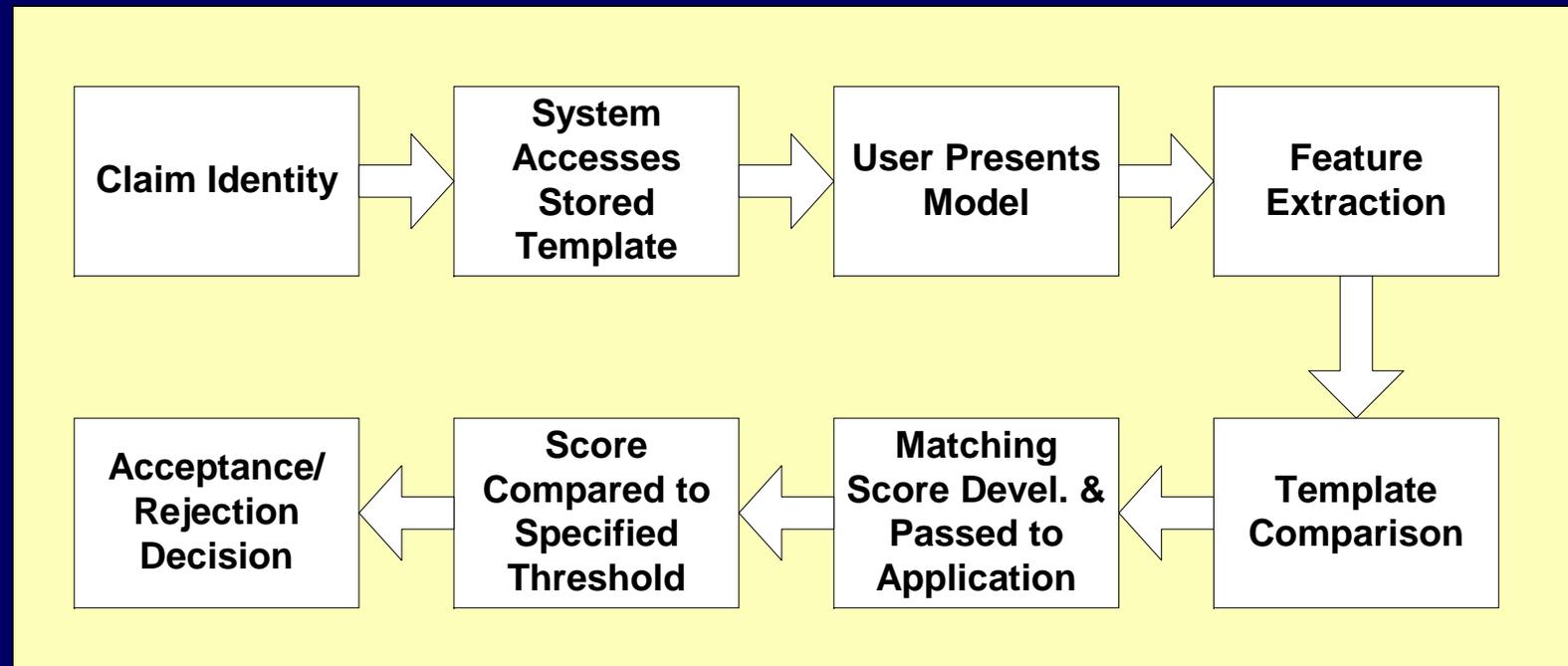
Template Storage





# The Biometric Access Transaction Process

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# Biometric Applications

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## Logical Access

- Logon (password replacement)
  - OS, E-mail, databases, applications
  - Web-based resource access
  - Document locking (Excel, Word etc.)

## Physical Access

- Integrated, multi-portal
- Single point stand-alone
- Perimeter Access

## Accountability

- Aircraft and ship manifests
- Refugee/Detainee operations
- Equipment issue





## Fingerprints

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- **Optical or capacitance sensor**
- **Operates in 1:1 or 1:many mode**
- **Template size >200 bytes**
- **Most proven and commercially supported biometric**





## Hand Geometry

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- Full hand or two-finger geometry
- Physical access or time & attendance
- Easy to use - minimal use cooperation
- Capable of exterior access applications
- Operates in 1:1 mode
- In use by Disney and Scott AFB
- Template size 9 bytes





## Iris Recognition

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- **Relatively more secure - no iris duplicates worldwide**
- **Easy to use - minimal use cooperation**
- **Generally operates in 1:many mode, can do 1:1**
- **Template size 512 bytes**





## Facial Recognition

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- Captured from live video camera
- Non-intrusive
- Operates in 1:1 or 1:many mode
- Performance can be affected by significant variances in lighting and view angle of face
- Template size 100 – 3.5 kbytes

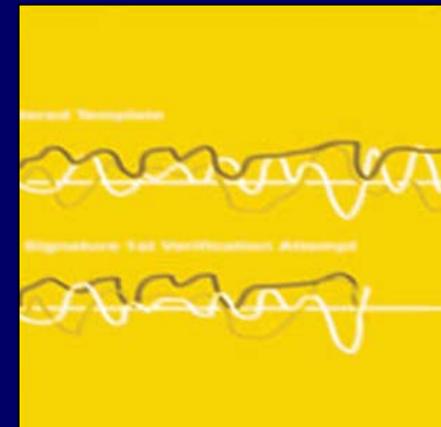




## Voice Verification

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- Also called speaker verification
- Hybrid physical/behavioral
- Operates in 1:1 mode
- Microphone and speakers only hardware
- Usually requires user cooperation
- Affected by background noise
- Template size 6 kbytes





## Signature Verification

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- Uses speed, stroke order, and pressure of stylus
- Matches writing behavior, not checking for forgery
- Operates in 1:1 mode
- Template size 1500 bytes

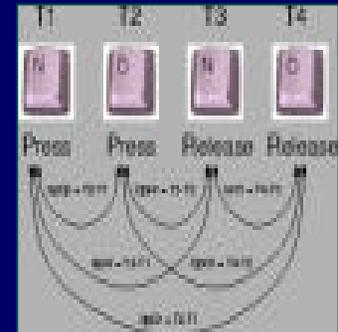




## Other Biometrics

- Key stroke
- Retina scanning
- Vein pattern- hand
- Vein pattern- facial
- thermography
- Ear lobe
- Gait

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## Layered Biometrics Approach

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- **Use of two or more independent systems**
- **Combined to yield final result**
- **Allows varied security levels**
- **Facilitates Section 508 compliance**



# Challenges of Using Biometrics

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## Cost

- The costs of many biometric systems are dramatically dropping

## Lack of industry standards

- Biometrics are a relatively new technology and the governing bodies have struggled to apply standards that are prevalent in other technologies



# Challenges of Using Biometrics

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## Lack of understanding

- How do biometric systems work
- What can biometrics offer to enhance security

## Need for Metrics

- Data on biometric performance
- Data on applications (e.g., cost-benefit analysis)



## Summary

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**Biometrics are ready to improve DoD security and readiness**

**Biometrics can be used with CAC and PKI to improve Identity Management**

**[www.biometrics.dod.mil](http://www.biometrics.dod.mil)**



## Contact Information

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**DoD Biometrics Website**  
**[www.biometrics.dod.mil](http://www.biometrics.dod.mil)**

**DoD Biometrics Help Desk**  
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