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QUÉBEC 2004

Canada Day at DLID Summit, Houston, Texas, February 29th, 2004

Biometric Technology for DLID

An introduction to the science

(as applied to Canadian requirements)

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Biometrics: Defined

Automatically recognizing a person using distinguishing traits. (A narrow definition)

Biometric technologies are defined as automated methods of identifying or verifying the identity of a living person based on physiological or behavioral characteristics.
Recently, this was modified to include chemical attributes (DNA) Nov. 2003

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Biometric Market Today

16+ Technologies

540+ Biometric Vendors

What are they

and

How do you choose?

1997 – Snap Shot

8 Technologies

20+ Biometric Vendors

What are they
and
How do you choose?

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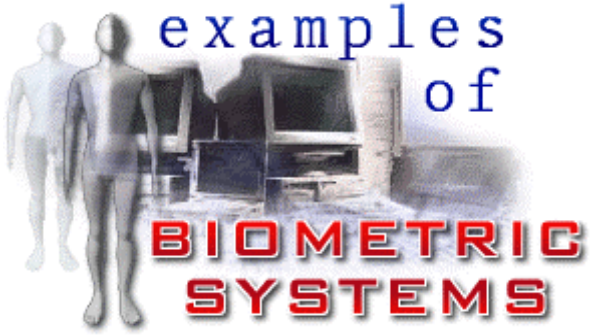
Biometric Technologies

- Iris Recognition
- Finger Scans
- Hand Geometry
- Facial Recognition
- Signature Dynamics
- Voice Dynamics
- Retinal Scan
- Keystroke Dynamics



Behavioral is difficult to enroll for DL/ID
Physical biometrics apply to DL/ID

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Biometric Terminology

Verification 1:1

Measurement of an identity against a single claimed identity

Answers the question:

Am I who I claim to be?

Identification 1:N (many)

Measurement of a single identity against multiple identities

Answers the question:

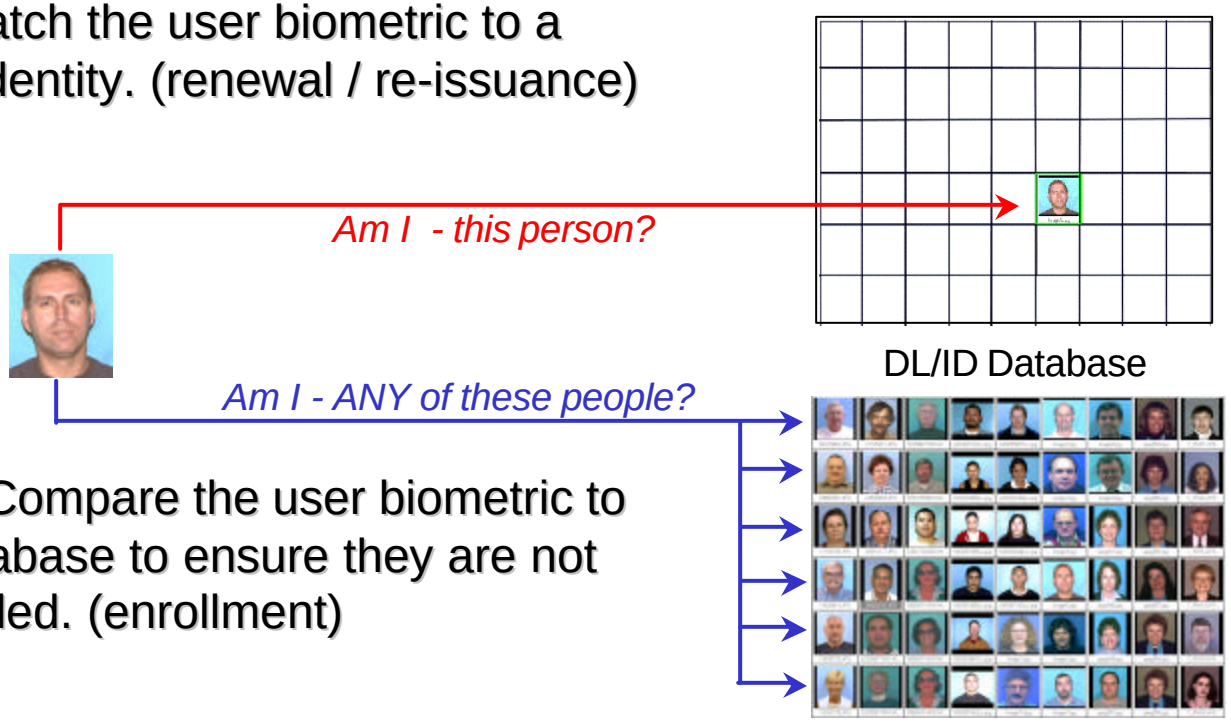
Who am I?

1D1R *(1 driver – 1 record):*

Requires identification, to ensure that I am enrolled only once.

DL/ID Biometric Uses

Verification – Match the user biometric to a single claimed identity. (renewal / re-issuance)



Identification – Compare the user biometric to all others in database to ensure they are not previously enrolled. (enrollment)

DL/ID requires biometric that can perform BOTH verification & identification

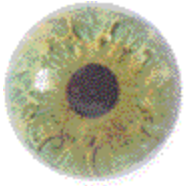
Iris Recognition

Issues/Obstacles

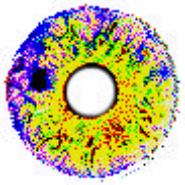
- Expensive cameras
- Sole source worldwide licencing
- Enrolment limitations
- Distance for capture (< 4 feet)

How it works

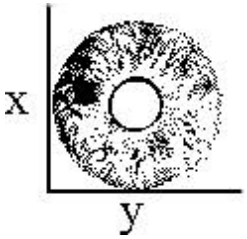
Video Capture



Trabecular Meshwork



Optical “Fingerprint”

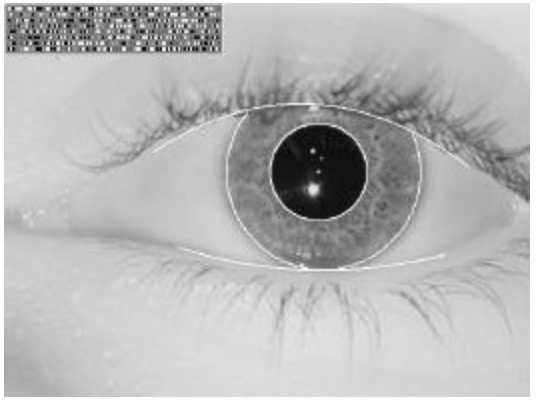


Iris Code Record

Iris Recognition

Features/Benefits

- Highest accuracy (1:N)
- Constant throughout adulthood
- No physical damage (picture not scan)
- Requires cooperation



Iris sampling offers more reference coordinates than any other biometric.
Mathematically, it therefore has a higher accuracy potential than any other biometric.

Iris recognition has never had a FALSE match

Iris recognition is suitable for both Identification & Verification

Iris Recognition Applications

Financial Services
Ak Bank (Turkey)
Citibank (NY)
Dresdner Bank (Germany)
Nationwide Building Society (UK)
Takefuji Bank (Japan)

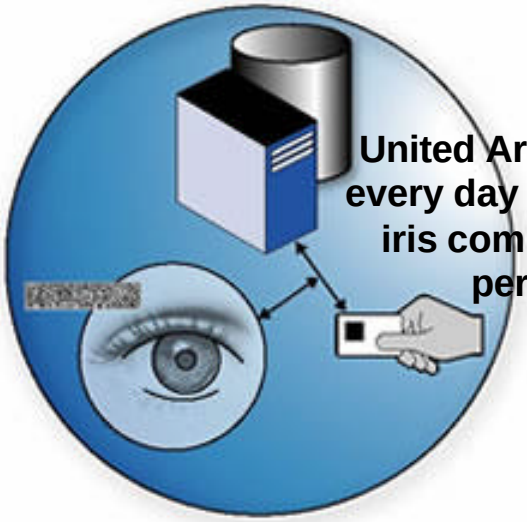
Computer Security
Hewlett Packard
KPN Telecom (The Netherlands)
U.S. House of Representatives, Legislative Counsel (DC)

Government

CCRA CANpass – 2003

Germany – FRApass 2004

UK National ID Card – (2005)



United Arab Emirates - every day about 2 Billion iris comparisons are performed

Canada Customs & Revenue

Client: Canada Customs and Revenue (CCRA)

Application: Border Control – CAN-PASS. Eight airports starting with Toronto and Vancouver in Q4 ’02. Trials with U.S. at Ottawa and Montreal in 2003.

System Integrator: IBM Global Services

Background: “Iris is your passport.” CCRA will charge $50 annual fee. Card based.

Number of users: 100,000 – largest public sector use of Iris thus far in Canada.

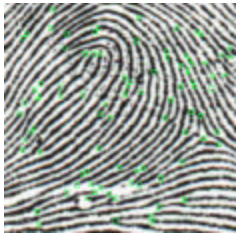
Finger Scan

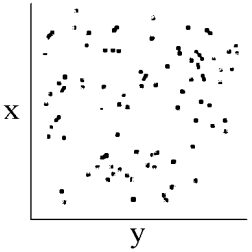
Issues/Obstacles

- Intrusion perception
- Exemptions
- Compatibility (negative opinion)
- Capture device resolutions

How it works

Image Capture → Minutiae Identification → Template Mapping → Record Formation





Finger Scan

Features/Benefits

- High accuracy
- Reliable
- Most widely deployed
- Capture device variety
- Low cost devices *

* Not all finger scanners suitable for 1:N identification, due to low resolution

Finger Scanning is suitable for both Identification & Verification

Finger Scan Applications

Financial Services
Banking ATM
Internet Banking
Retail Transactions

Secure Access
Microsoft
Oracle
New York Stock Exchange
New York Police Department

DL/ID Cards
Arkansas – V
California
Colorado
Georgia
Hawaii
Texas
W. Virginia

Finger Scan

Smart Card

Social Services
Texas
Connecticut
New York
Toronto*

*System withdrawn

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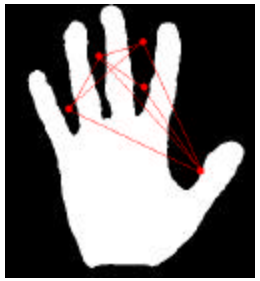
Biometric Technology for DLID

Hand Geometry

Issues/Obstacles

- Uniqueness
- Unsanitary (perception)
- FRR/FAR High
- Expensive scanner

How it works



Hand Code

43BFFFA60

Hand Geometry

Features/Benefits

- Reliable
- Non-intrusive
- Small record size (9 bits)
- Successful deployments

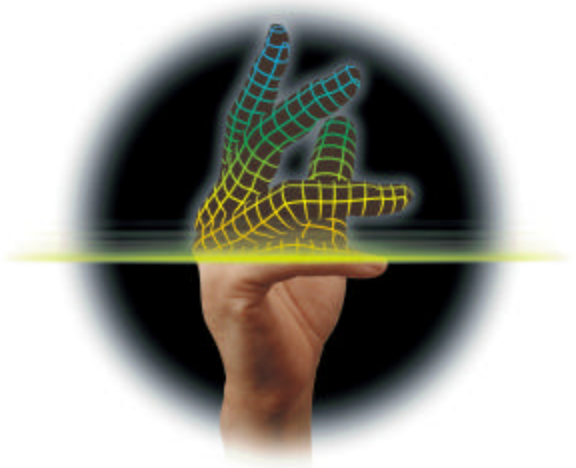
Hand Geometry is suitable for Verification only.

Hand Geometry is NOT suitable for Identification.

Hand Geometry Applications

Identification Cards

INSPass



Secure Access

IBM

Exodus

Sandia National Labs

San Jose State University

Time & Attendance

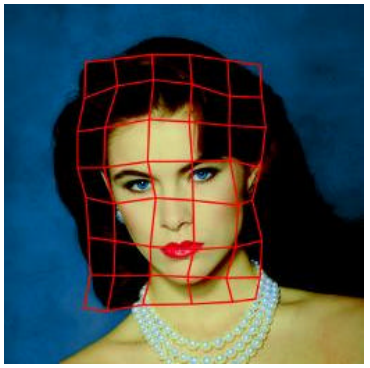
Coca-Cola

First Bank of Minnesota

Facial Recognition

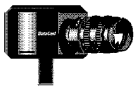
Issues/Obstacles

- FRVT 2002 – Low accuracy
- Eyewear issues (DL/ID)
- Vendor exaggerations
- No facial template standard

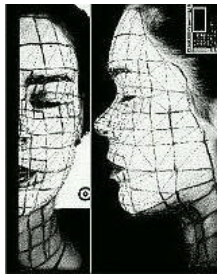


How it works (Geometric)

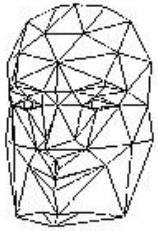
Photo taken / Index located

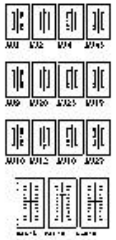


Nodal Points



Template created (numeric)





Other methods:

Eigenface

Feature analysis

Neural network

Automatic face processing

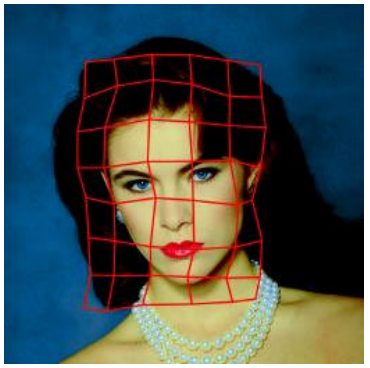
Thermography

3-D Modeling

Facial Recognition

Features/Benefits

- DL/ID – Low hardware cost
- DL/ID – Image dB exists*
- Existing process
- Controlled enrollment



* Images in databases may not be suitable for automatic template extraction.

Facial recognition is suitable for Verification.

Facial recognition is a useful tool for assisting Identification.

Facial Recognition Apps

Identification Cards

West Virginia Driver License

Illinois Driver License

Alberta Operators Licence

Mexican Voter Registration

Secure Access

IBM (Thinkpads)

DeutcheBank

MGM Casino

Sydney Airport *

Surveillance

CD Airport Paris

West Ham Football London

Airport – Logan & Tampa *

*Systems withdrawn

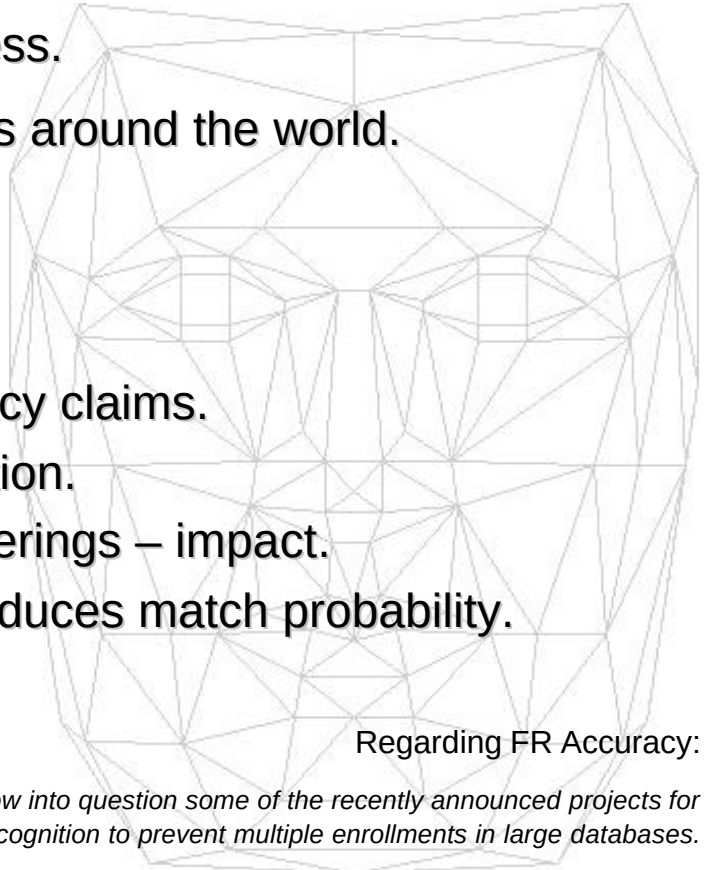
Facial Recognition Continued

Positive

- Facial image capture existing DL/ID process.
- Estimated 2 billion images in ID databases around the world.
- Innocuous in a DL/ID environment.

Negative

- FRVT 2002 indicates questionable accuracy claims.
- Disguises can easily defeat facial recognition.
- Lighting, age, glasses, and head/face coverings – impact.
- Aging of comparison images drastically reduces match probability.



Regarding FR Accuracy:

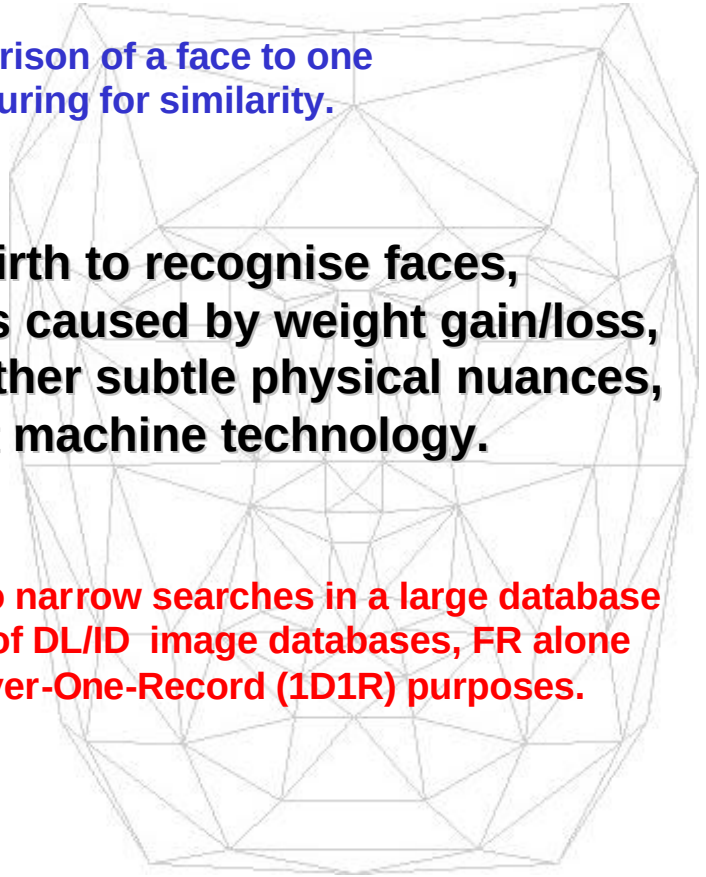
…this seems to throw into question some of the recently announced projects for use of facial recognition to prevent multiple enrollments in large databases.

Dr. Jim Wayman - San Jose State University

Biometrics in Human Services Volume 5, Issue 3

Facial Recognition Continued

Facial Recognition (FR) is the comparison of a face to one or more reference faces, measuring for similarity.



The human brain, conditioned from birth to recognise faces, compensates for appearance differences caused by weight gain/loss, hairstyle, aging, facial hair, makeup or other subtle physical nuances, more effectively than any current machine technology.

Facial Recognition (FR), like filtering, is a useful tool to narrow searches in a large database of images. Given the renewal cycles and magnitude of DL/ID image databases, FR alone would be insufficient as the biometric for One-Driver-One-Record (1D1R) purposes.

Canadian Biometric Initiatives

Alberta Operator Licence - 2003

Facial recognition – Initially used as a verification check, may attempt to utilize as an identification application.

CANpass - 2003

Iris recognition – Used to allow rapid cross border travel. Uses an optical card to store Iris template.

CATSA - 2004

Finger/Iris - New program to be deployed 2004 to secure airport areas using biometric smart card and gate access for employees.

Canadian Passport – 2004

Facial recognition - (+ secondary biometric?) Smart chip to be added to passport and to include biometric templates (ICAO standard).

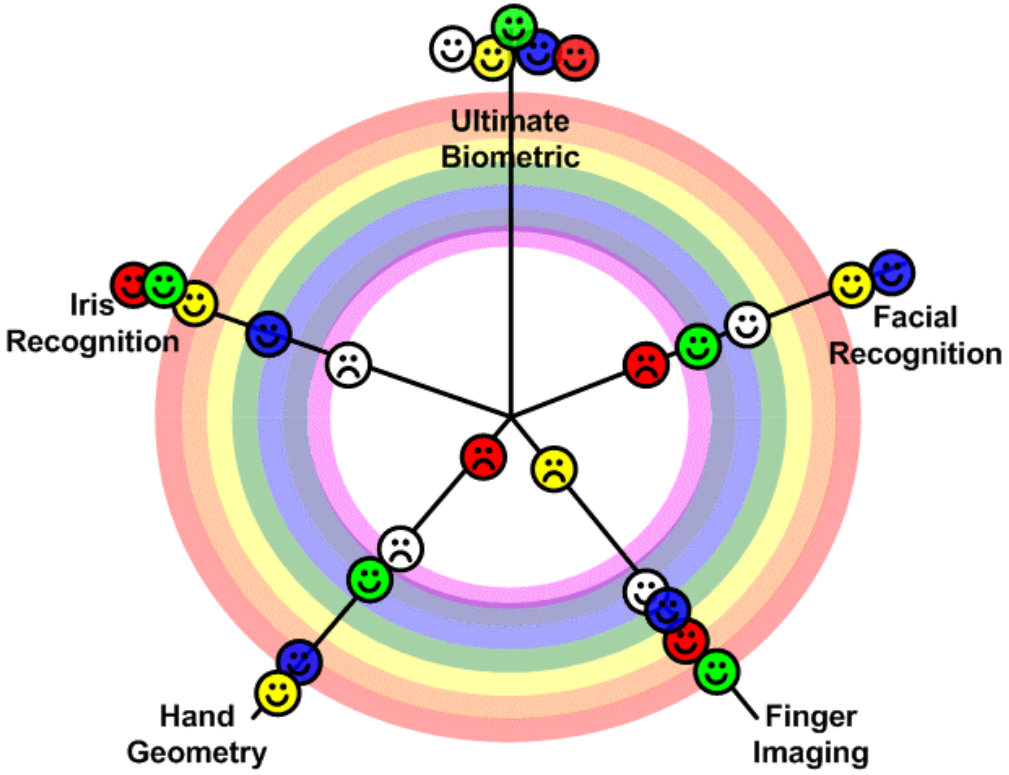
Toronto Welfare 1997-1999

Finger scanning – Designed to prevent multiple enrollment of welfare recipients. Program abandoned in 1999.

CIC – National ID card 2003 - 2010

Undecided – current House of Commons debate whether to establish a new National Identity Biometric Card.

Choosing a Technology



FIVE FACTORS

- Identification
- Verification
- Effort
- Intrusiveness
- Cost

Acceptable Zone

Data Considerations

Technology	Template size (Bytes)
Iris Recognition	512
Finger Imaging	200 - 512
Hand Geometry	9
Facial Recognition	88 - 1024

Machine Read Technology	Storage Capacity	Relative Cost
2-D Barcode	1800	Very Low
Magnetic Stripe	204	Low
Smart Chip	64k	High
Optical / Laser Card	2MB	Very High

Match your biometric technology needs with machine read needs, and consider the costs.

Storing a biometric in a Card

2-D Barcode

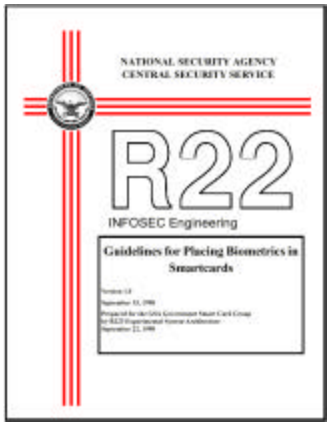

Finger Minutiae Extraction and Format Standard for One-to-One Matching

American National Standard

Employ internationally accepted, secure biometric & PKI methods.

No need to re-invent the wheel!

Smart Card



Unlike a PIN, a user Biometric cannot be replaced.
Therefore template/data stored on cards MUST be secure from theft or wrongful access.

Biometrics stored in Machine Readable Documents (MRD) will likely require mandatory encryption to meet Canadian privacy requirements.

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Biometric Industry Fact

- Iris is the number one technology in accuracy
- Finger is biometric leader (market share)
- Facial is an “easy” addition to DL/ID
- Compounded biometrics for accuracy (US VISIT; UK ID)
- Verification is publicly appealing (combats identity theft)
- Voluntary enrollment is increasing (“Opt-in”)
- Passports to contain biometric(s) next year (2004)

Practical Solutions

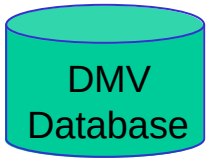
Higher Security

Accuracy

Iris Recognition

Finger Scan

Facial Recognition



Cost

Lower Security

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Biometric Technology for DLID

Biometrics: Canada

Canadian jurisdictions will face tough Privacy issues

PR preparation prior to any announcement is MANDATORY

Broad stakeholder consultations may be required

Finger imaging faces biggest "scope creep" fears

Canadian Solutions

- Initially automate existing manual procedures – facial comparison
- Store on card? – "Opt-in" for public approval
- Add / Improve filtering and dB search methods to improve identification search when using no biometric or less accurate technologies
- Use 4 key data search on IRE (with biometric option)

Biometrics: Reality

Facial is a useful tool to improve the identification search process.

Biometrics can ensure the verification of an individual to their own record.

Iris recognition is likely the only biometric technology that can singularly meet the 1:N need for identification in North America DL.

Reality Check

vMost biometric technologies can be duped

vNo single biometric can enroll ALL applicants

vNo biometric can prove 100% accuracy

vBiometrics will not GUARANTEE multiple enrollee prevention

vHuman intervention WILL be required to resolve probable matches

Get more info here:

www.idsysgroup.com

Biometric Technology Resource Centre

www.biometrics.org

US Government focal research site