2013 region II conference
AAMVA
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Welcome to *Interagency Use of Facial Recognition…. Does it work?*

Please record your attendance using the Sign In Sheet

June 10, 10:30 a.m. - Noon

International Salon 2

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Interagency Use of Facial Recognition… Does it work?

Moderator: Lance Taylor

Georgia Department of Driver Services

June 10, 10:30 a.m. - Noon

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Florida's Facial Recognition Network

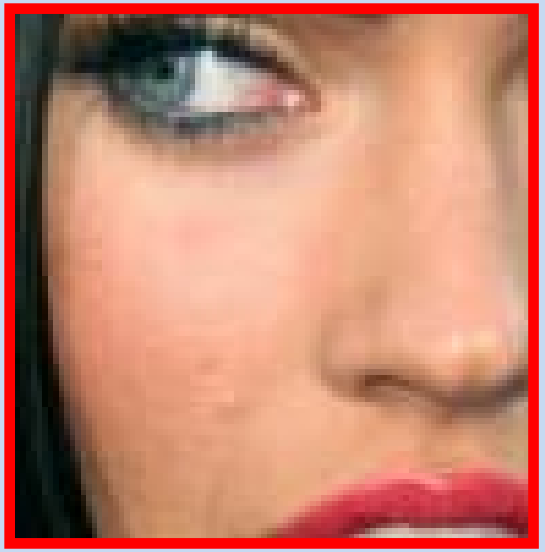
Hosted by Pinellas County Sheriff's Office

Advances in Facial Recognition

Inter-agency collaboration – how does it work?

FACES
Face Analysis Comparison & Examination System

A quick exercise



The Pinellas County Sheriff's Office (PCSO) began efforts with FR technology in 2001 and has since emerged as a primary provider of law enforcement applications for face recognition.

PCSO uses FR for corrections processing, mobile identification, investigations, and allows access to trained authorized users via Florida's Criminal Justice Network (CJNET).

Square Miles:	**279**
Population:	**917,000**
Agency Members:	**2,800**
Annual Bookings:	**55,000**
Avg. Inmate Pop.:	**3,400**

Patrol Operations
Corrections Operations
Judicial Operations

PCSO Facial Recognition Components:

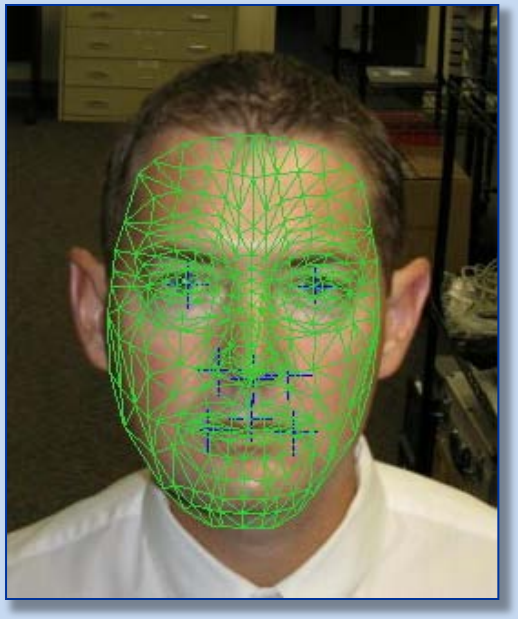
- *Corrections Processing* – Identification and Verification at Booking
- *Mobile Identification* – Street Level Identification
- *Investigations* – Investigative Browser Web Based Search Tool
- *Statewide FR Partnership* - to Authorized Users via FR-Net

2001 - 2008

- ✓ Implemented Facial Recognition enabled mugshot system
- ✓ Deployed web-based Image Query and Facial Search
- ✓ Initiated Statewide data sharing expansion effort
- ✓ Deployed Mobile Identification Systems (MIS)
- ✓ Contract with DoD Irregular Warfare Support Program

2009 - 2013

- ✓ Integrating Florida DHSMV
- ✓ Contract with DoJ Community Oriented Policing Services
- ✓ NIJ Grant with Michigan State University on Sketch Matching
- ✓ Contract with DoD Biometric Identity Management Agency (BIMA)
- ✓ FACES – Face Analysis, Comparison, and Examination System
- ✓ Online user training



PCSO participates with emerging and novel face recognition tools and processes that benefit law enforcement, military and federal government through involvement with:

- ✓ DoD Irregular Warfare Support Program (IWSP)
- ✓ DoJ Community Oriented Policing Services (COPS)
- ✓ DoD Biometric Identity Management Agency (BIMA)
- ✓ FBI's Facial Identification Scientific Work Group (FISWG)
- ✓ National Institute of Justice
- ✓ DHS Biometrics TWG
- ✓ IEEE – Certified Biometrics Program

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Ybor cameras won't seek what they never found

After two ye
facial-recogn
led to a singl

By BRADY DENNI
© St. Petersburg Tim
published August 20,

Call It Super Bowl Face Scan I

Declan McCul 02.02.01

acked into a Florida stadium for Super
ere also being watched.

passing through turnstiles and flashed
reens of a police control room.

ords Reveal
on Technology

em, ACLU Reports

Firm defends '

By Lisa M. Bowman
Staff Writer, CNET News

Face-Re
Results

By ANDY NEWMA
Published: May 3,

Post a comment

Early Facial Recognition Systems met with mixed results and reviews. Public scrutiny assisted the direction of future successful use and outcomes.

Facial recognition technology proving effective for Pinellas deputies

By Kameel Stanley, Times Staff Writer
In Print: Tuesday, July 21, 2009

Pinellas Deputy Mark Eastty, who got his mobile facial-recognition unit in May 2008, has "used it over 100 times now." He said, "I've actually never had anyone give me grief over it."

The Pinellas County system is the largest database of its kind in the country

Video | Photo

SHARETHIS
Recommend 57 people recommend this. Sign Up to see what your friends recommend.
Tweet 2 +1 0

Posted: 04/17/2013

By: Alison Morrow

CLEARWATE[illegible] Several pictures of the Boston Marathon bo[illegible]gs are circulating Facebook. One [illegible] an unk[illegible]n person on the top of a building [illegible] be exp[illegible]ns. The caption asks people if [illegible] any[illegible]g.

It'[illegible]e o[illegible]sands of images facing FBI ag[illegible] as t[illegible]b through faces of terror and [illegible] to find [illegible]hat might look more suspicious.

Face recognition next in terror fight

Updated 5/10/2007 8:01 AM | Comments 5 | Recommend 1 E-mail | Print | Reprints & Permissions | RSS

Enlarge By Mike Carlson for USA TODAY

Scott McCallum, system analyst for the Pinellas County Sheriff?s Department, demonstrates facial-recognition software using a collection of his own images. The software can compare a digital photo taken in a surveillance area with a database of more than 4.5 million photos.

By Thomas Frank, USA TODAY

Mixx it
Other ways [illegible]are:
Digg
[illegible]icio.us
[illegible]
Reddit
Facebook
W[illegible]this?

In states such as Florida and Virginia, law enforcement officers experiment with facial-recognition technology and uncover systems' pros and cons

Police in one of Florida's largest counti[illegible] are hoping that a digital camera may be [illegible] the crime-fighting weapon of the future.

The $200 cameras do more than photograph people questioned on Pinellas County streets along Florida's west coast. Deputy sheriffs transmit a mug shot from car laptops to a database holding 4.5 million digital photos of people who've been arrested in Pinellas and five other Florida counties.

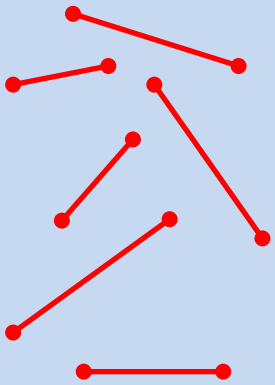
FACIAL RECOGNITION: Next weapon against terrorism?

NOW

The public views face recognition technology as a force multiplier for law enforcement operations.

Facial recognition analyzes the characteristics of a person's facial features. It measures the overall facial structure, including distances between eyes, nose, mouth, and jaw.

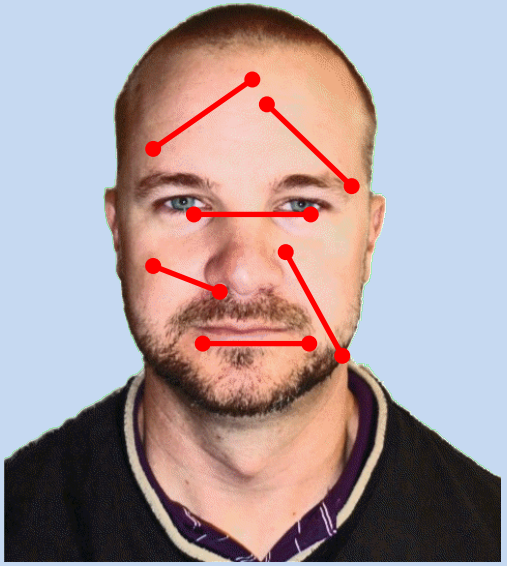
Fingerprint



AFIS for Faces

Produces a mathematical value to uniquely represent and identify a face

Faceprint



Advantages: minimal user interaction, non-intrusive, verification or identification can be accomplished

Disadvantages: image quality dependent, public perception

FR enrolls a subject's facial image...

Probe

Templates are applied to the image...

A unique template – a *facial value* – is produced...

Value

The probe is searched against one or more data sets of other facial values...

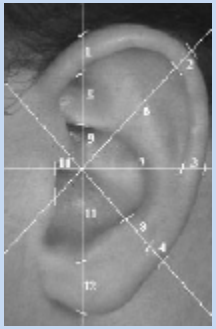
The FR system returns an image gallery of rank-ordered results :

What is driving the need for facial recognition…

With other biometric solutions available, why FR?

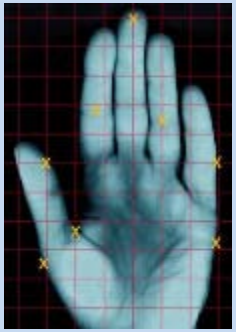
- Face is the most collected Biometric
- Less constraint for sharing face data (Within law enforcement)
- Lack of physical evidence (Sometimes face is all we have)
- Interaction at safe distance.

Vein Pattern


Ear Pattern

Fingerprint

Iris


Hand Geometry

Gait

Vein Pattern

Affects Review

- ✓ Twins
- ✓ Aging

Will not work:

- ✓ Masks

Affects Performance:

- ✓ Poor Image Quality
- ✓ Significant Aging
- ✓ Sunglasses
- ✓ Facial Hair
- ✓ Plastic Surgery

Misconceptions

In Hollywood Facial Recognition:

Can use any equipment.

Can be used anywhere.

Can search against anyone.

Can use any image.

User Expectations for Face Recognition

ATM Robbery

Unknown Subject

No Match

Reasons that you can't find a match:

The suspect is not in the database

Poor quality image

Poor quality enrollment

The suspect's appearance has changed significantly

They're there but you don't see them

Automated Face Recognition and obvious matching

YOU… determine what a match is…

What helps the operator with comparison?

Face Identification Training

Images redacted

The proliferation of automated FR systems is driving the need for education in Facial Identification.

Facial Recognition is a valuable enhancement to law enforcement identification and verification processes.

Law Enforcement must have a realistic understanding of the technology.

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Face Recognition Components at Pinellas

Intake – 1:N

Release – 1:1

Formal Booking – 1:N

Inm

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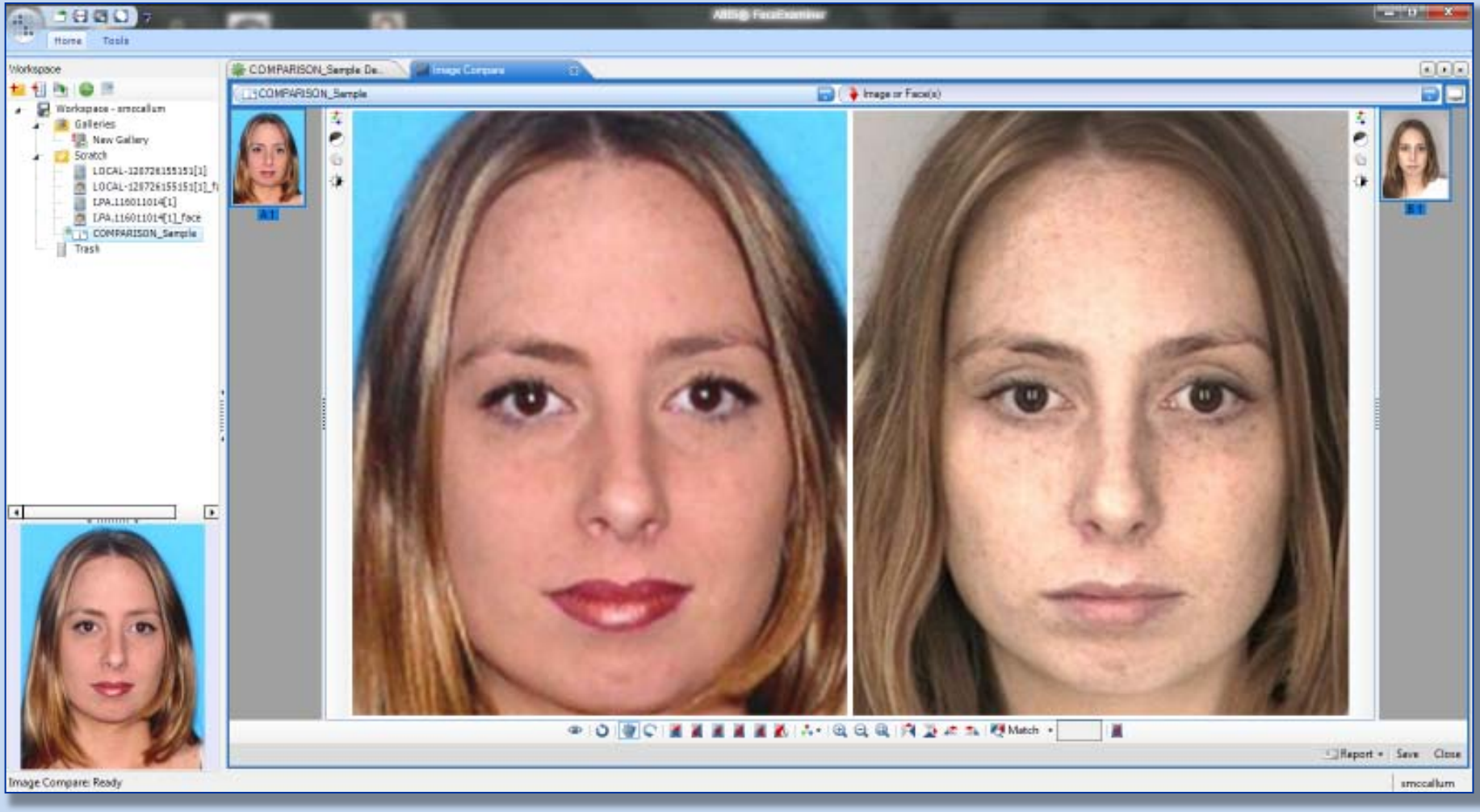
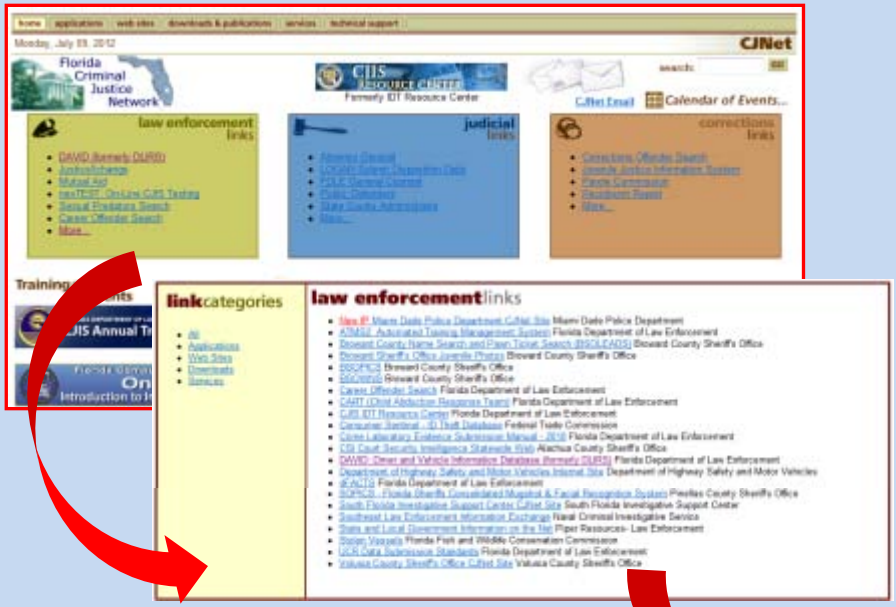
Manual examinations of face image sets to assist in determining identity.

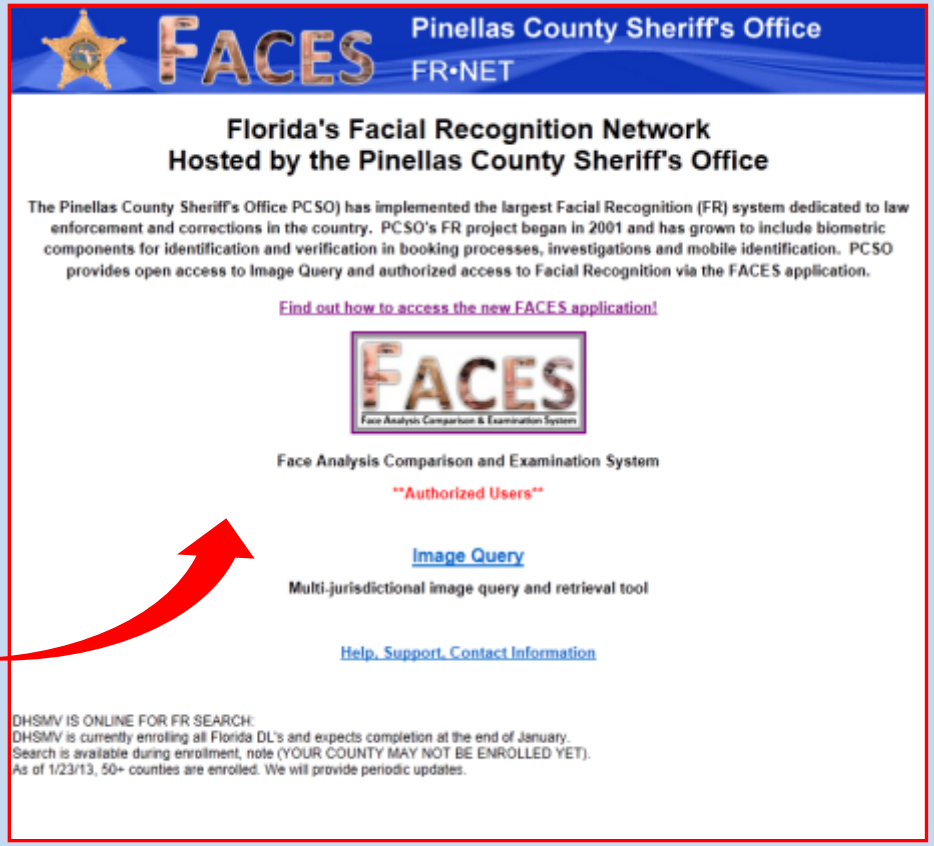


Identity Comparison Report dispensed to requesting agency.

Images redacted

FACES
Pinellas County Sheriff's Office
FR•NET
Application DB-Query Demographics Reset Help
Logout User: PCSO\test
+ - R PROBE S T <- -> TARGET (gallery)
C Q N Small Large LargeTx Matches
Enrolled 07/09/2012 10:00.
Name: CASANDRA LEIGH TELLING
DOB: 10/10/1981 (now:30)
ImgDate: 09/16/2003 09:06 (age:21)
Source: Pinellas
Search Filter Enroll Remove
WORKSPACE





FR-Net is available through the law enforcement links section of CJNET

1500+ Florida LE users and growing

PCSO processes search requests from local, state and federal agencies.

Request process is simple:

email submission from agency email with original/best quality image to:

FRNET@pcsonet.com

Images redacted

Image enhancement is performed to ***adjust non-standard*** or "in the wild" images to better perform with automated facial recognition searches.

- ✓ Normalize and enhance to improve search performance
- ✓ Occlusion removal if possible
- ✓ 3D renders for pose correction

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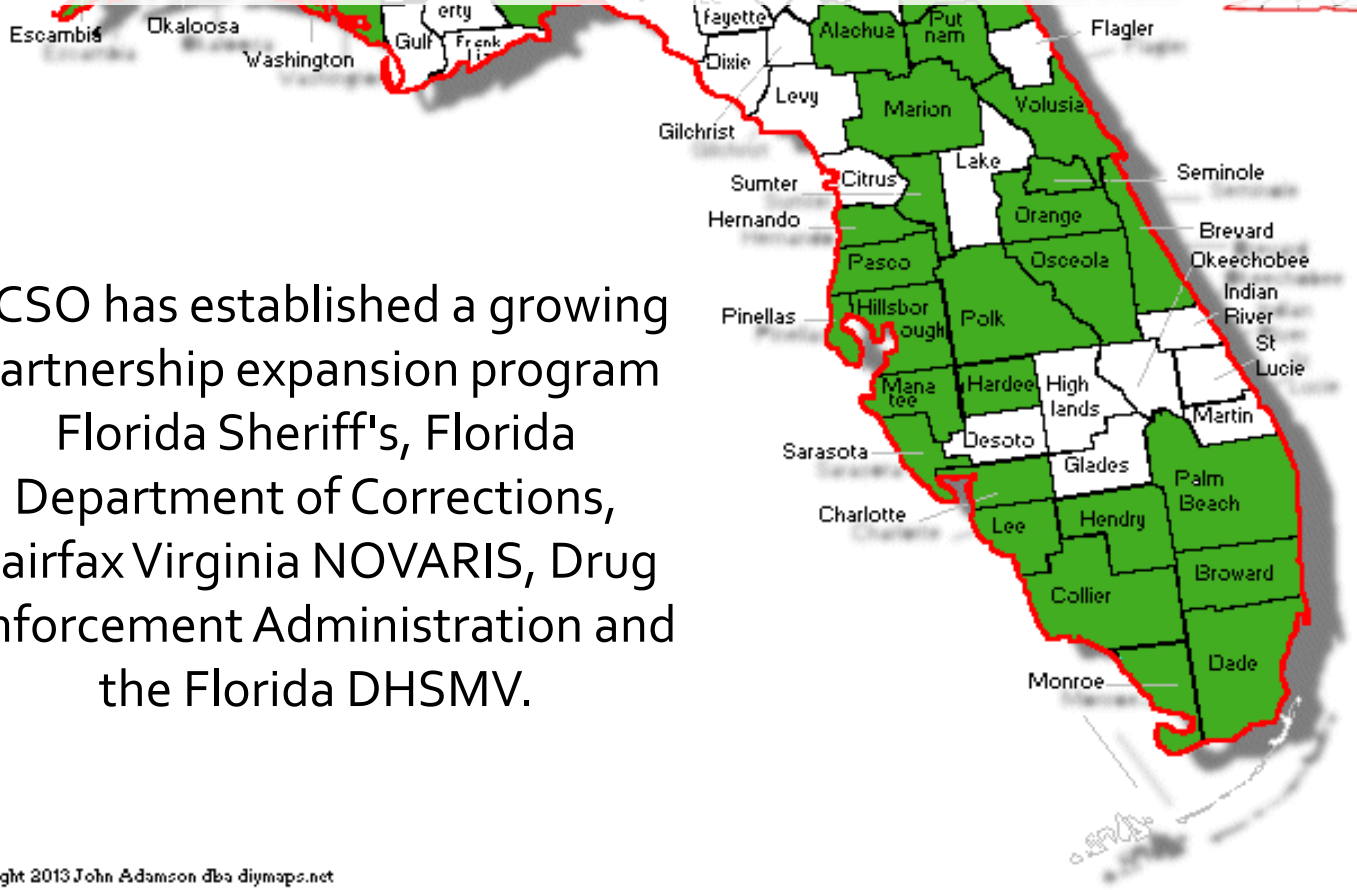
FR-Net Partnerships
&
Expansion

FACES
Face Analysis Comparison & Examination System

10 Million Records



PCSO has established a growing partnership expansion program Florida Sheriff's, Florida Department of Corrections, Fairfax Virginia NOVARIS, Drug Enforcement Administration and the Florida DHSMV.

Online

In Progress

Fairfax

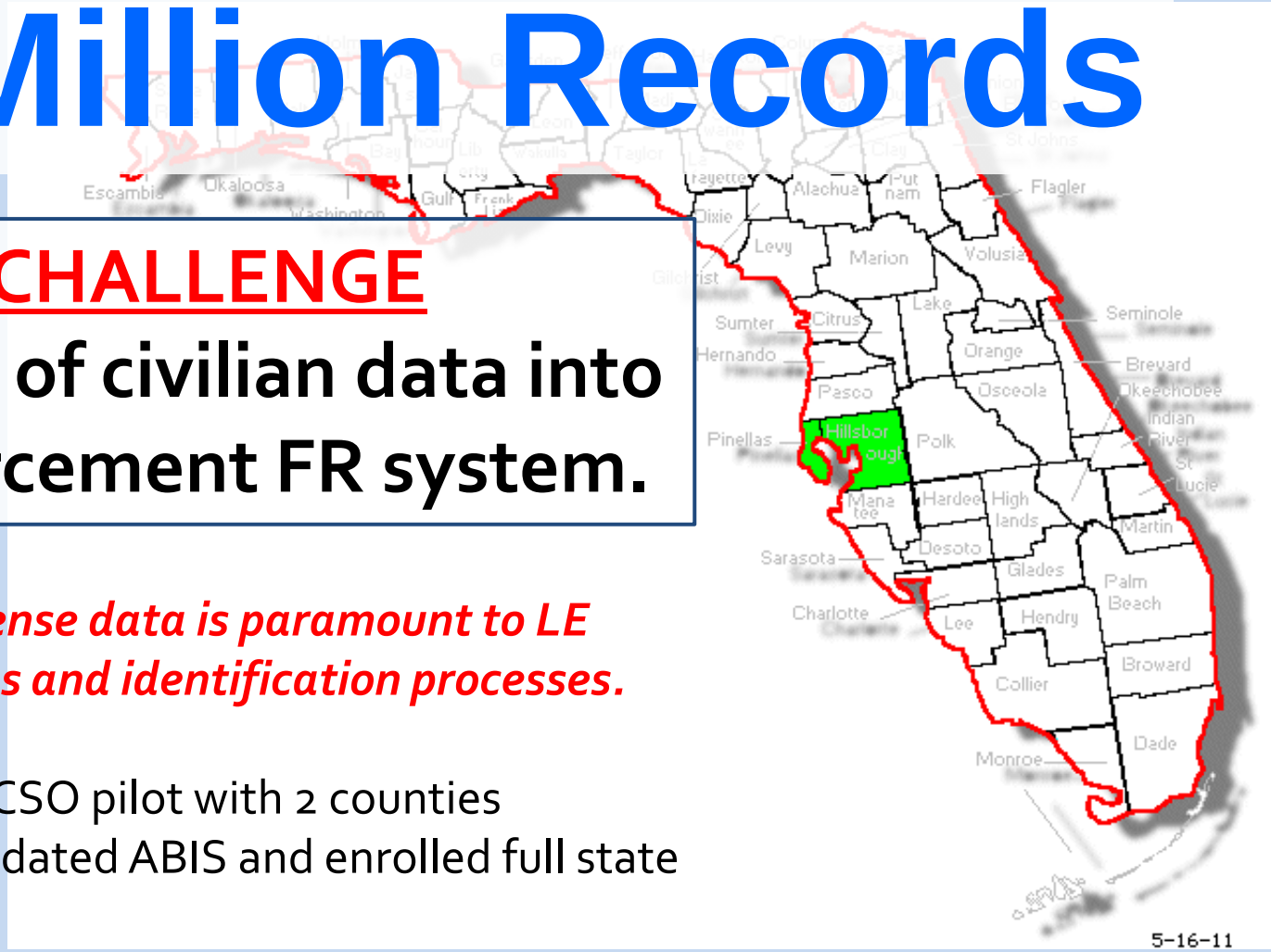
FL DOC
DHSMV Pilot
DEA JABS
USSOCOM Pilot

Copyright 2013 John Adamson dba diymaps.net

18 Million Records

BIG CHALLENGE

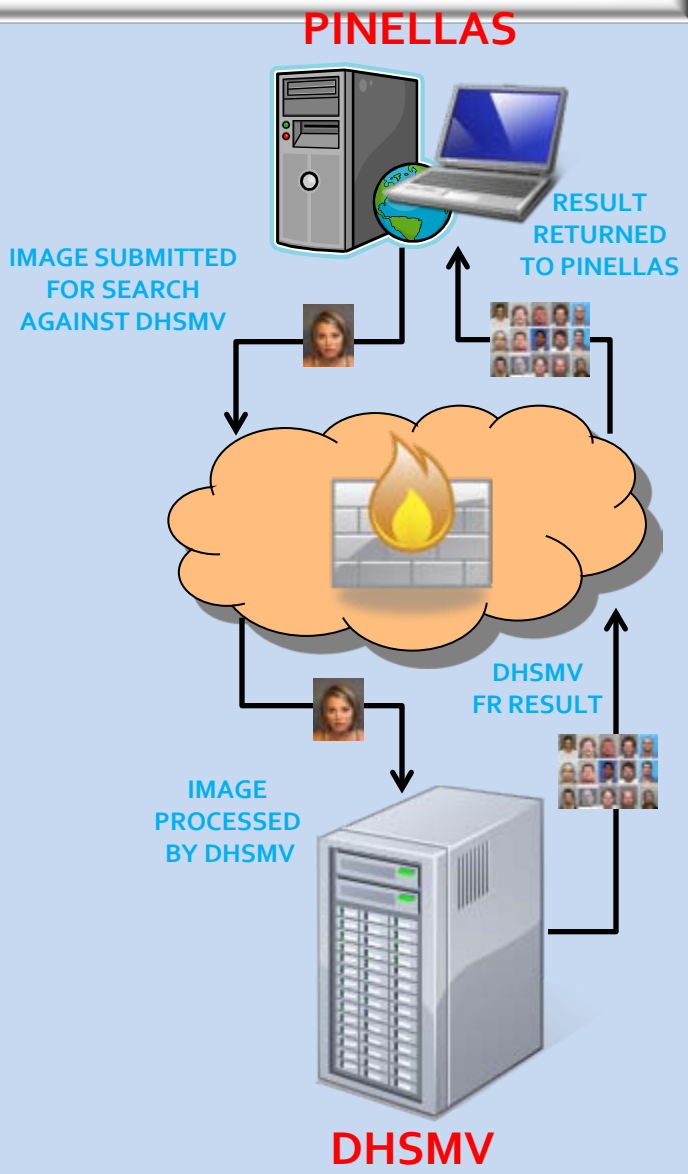
Integration of civilian data into a law enforcement FR system.



Driver's license data is paramount to LE investigations and identification processes.

2009 – DHSMV/PCSO pilot with 2 counties
2013 – DHSMV updated ABIS and enrolled full state

- ✓ DHSMV provides a web service to Pinellas to submit probes and return galleries
- ✓ All records remain with DHSMV
- ✓ PCSO submits an image for search against the DHSMV FR system
- ✓ DHSMV returns the FR result to PCSO's FACES application



The Florida Driver License

Biometric Identification Operating System:

Facial Recognition Solution (FDL-BIOS-FRS) provides a facial recognition solution for use by the Department and other stakeholder partners to combat identity related crime and terrorism by leveraging Florida Driver License images contained in the Florida Driver License Information System (FDLIS).

Current Status:

- Allows for analytical (investigative) comparisons against the full data-set of active driver license and ID card holders' latest digital image.
- Current image count +/- 17.2 million images
- Interface with the Pinellas County Sheriff's Office (PCSO)
- FACES System allows for investigative probe of the full DHSMV data set and Pinellas FACES data set

Current Project Enhancements:

Recent project enhancements have resulted in:

- Expanded access to law enforcement in both tactical (roadside) and analytical (investigative) environments
- Upgraded system to the latest version of system web interface (4.3)
- Upgraded system to the latest version of the MorphoTrust FR solution (ABIS 7)
- Increased web interface concurrent user license from 15 to 90 concurrent users

Current Project Enhancements: cont'

- Increased image count to +/- 21.5 million images (latest image from each active record)
- Added 6 Facial Examiner Workstations for deep analytics and adjudication (equipment and software)
- Provided Facial Examiner Workstation Training
- Provided 1,500 digital cameras to Patrol Operations Troopers for tactical deployment (training and deployment in process – cameras received)

Future Project Enhancements:

- 1:N (one to many) System Scrub and Flag
- 1:N and 1:1 Counter Matching will allow DHSMV to compare images at the time of license issuance to detect and prevent fraud
- Can interface with other facial recognition systems which contain images from corrections and/or local law enforcement agency records management systems (RMS)
- Can interface with other government systems to prevent fraud, waste, and abuse
- Addition of other biometrics (Iris, Fingerprint, etc.)

- ✓ PCSO provides training, administers access, audits use for FR-Net
- ✓ All Florida Fusion Centers have access
- ✓ PCSO continues to expand partnership and collaborative efforts with:
  - FDLE's MEPIC
  - FDLE's Sex Offender &Predator
- ✓ Successes are shared with the LE Community to demonstrate how to utilize the technology

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TIPS AND HINTS...

In preparing an image to be facially searched, the normalization process sometimes includes cropping the face out of a wide field of view. Users may adjust orientation by rotating the face so that the eyes are leveled. Common image enhancements may include adjusting brightness, contrast, sharpening or blurring the image. Some common tools used to perform these enhancements include Adobe Photoshop, Paint. Net, and VuePrint to name a few. A simple application such as Microsoft PowerPoint can be used to superimpose images or overlay two images to align facial features to help with the review process.

In 2010 PCSO established Florida's Face Recognition Network (FR-Net) with a purpose to inform the LE community on pertinent FR activities, educate users, demonstrate successes and collaborate via a quarterly newsletter.

DOES YOUR AGENCY HAVE FACIAL RECOGNITION?

If your agency does not have facial recognition capabilities and would like to partner with PCSO and the FR-Net, please contact: FRNET@pcsonet.com for information.

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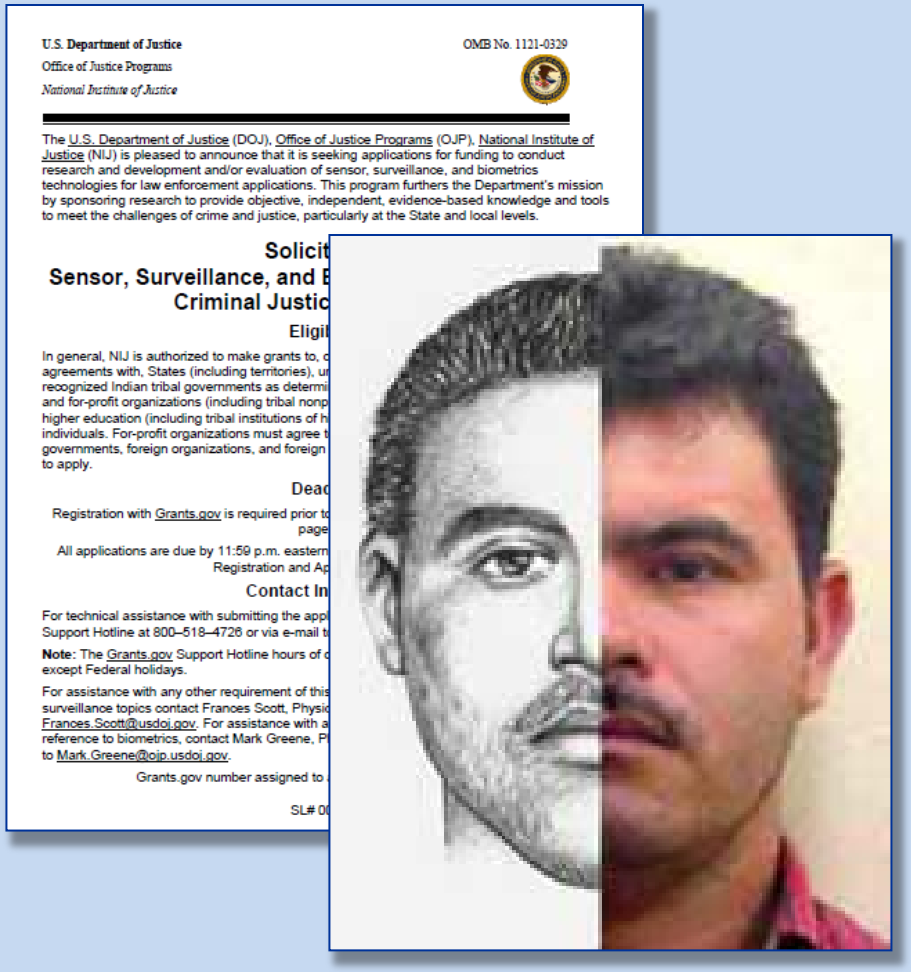
Pinellas County Sheriff's Office
Collaborative Face Activities

FACES
Face Analysis Comparison & Examination System

National Institute of Justice, PCSO collaborative with MSU

Project goal:

- MSU to build a sketch FR system
- Develop algorithm leading to higher sketch match accuracy
- Install prototype system at PCSO
- Evaluate performance
- **Completion: September 2013**



U.S. Department of Justice
Office of Justice Programs
National Institute of Justice

OMB No. 1121-0329

The U.S. Department of Justice (DOJ), Office of Justice Programs (OJP), National Institute of Justice (NIJ) is pleased to announce that it is seeking applications for funding to conduct research and development and/or evaluation of sensor, surveillance, and biometrics technologies for law enforcement applications. This program furthers the Department's mission by sponsoring research to provide objective, independent, evidence-based knowledge and tools to meet the challenges of crime and justice, particularly at the State and local levels.

Solicit
Sensor, Surveillance, and B
Criminal Justic

Eligi

In general, NIJ is authorized to make grants to, c
agreements with, States (including territories), u
recognized Indian tribal governments as determi
and for-profit organizations (including tribal nonp
higher education (including tribal institutions of h
individuals. For-profit organizations must agree t
governments, foreign organizations, and foreign
to apply.

Deac

Registration with Grants.gov is required prior to
page

All applications are due by 11:59 p.m. eastern
Registration and Ap

Contact In

For technical assistance with submitting the appl
Support Hotline at 800–518–4726 or via e-mail t

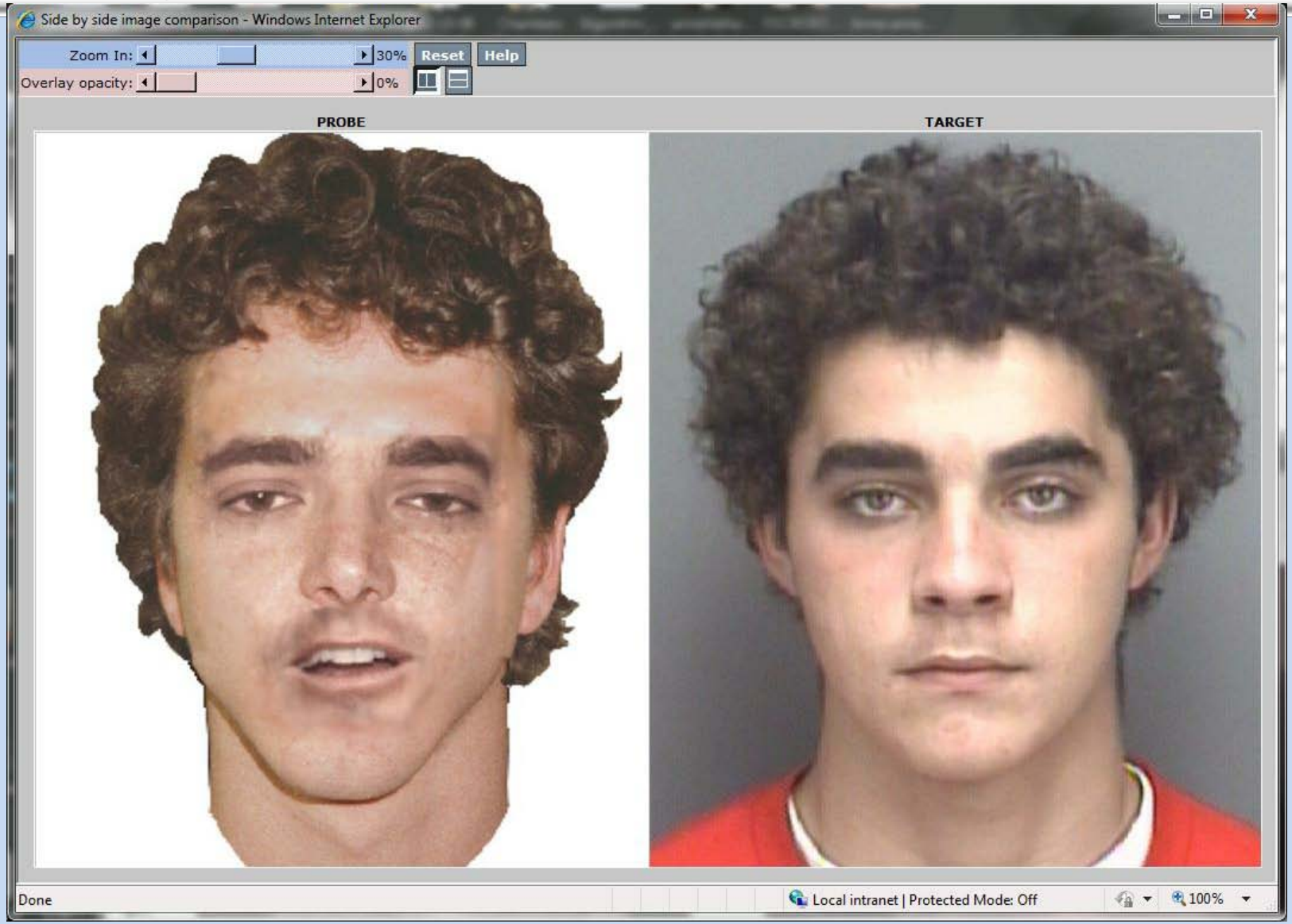
Note: The Grants.gov Support Hotline hours of o
except Federal holidays.

For assistance with any other requirement of this
surveillance topics contact Frances Scott, Physic
Frances.Scott@usdoj.gov. For assistance with a
reference to biometrics, contact Mark Greene, P
to Mark.Greene@ojp.usdoj.gov.

Grants.gov number assigned to

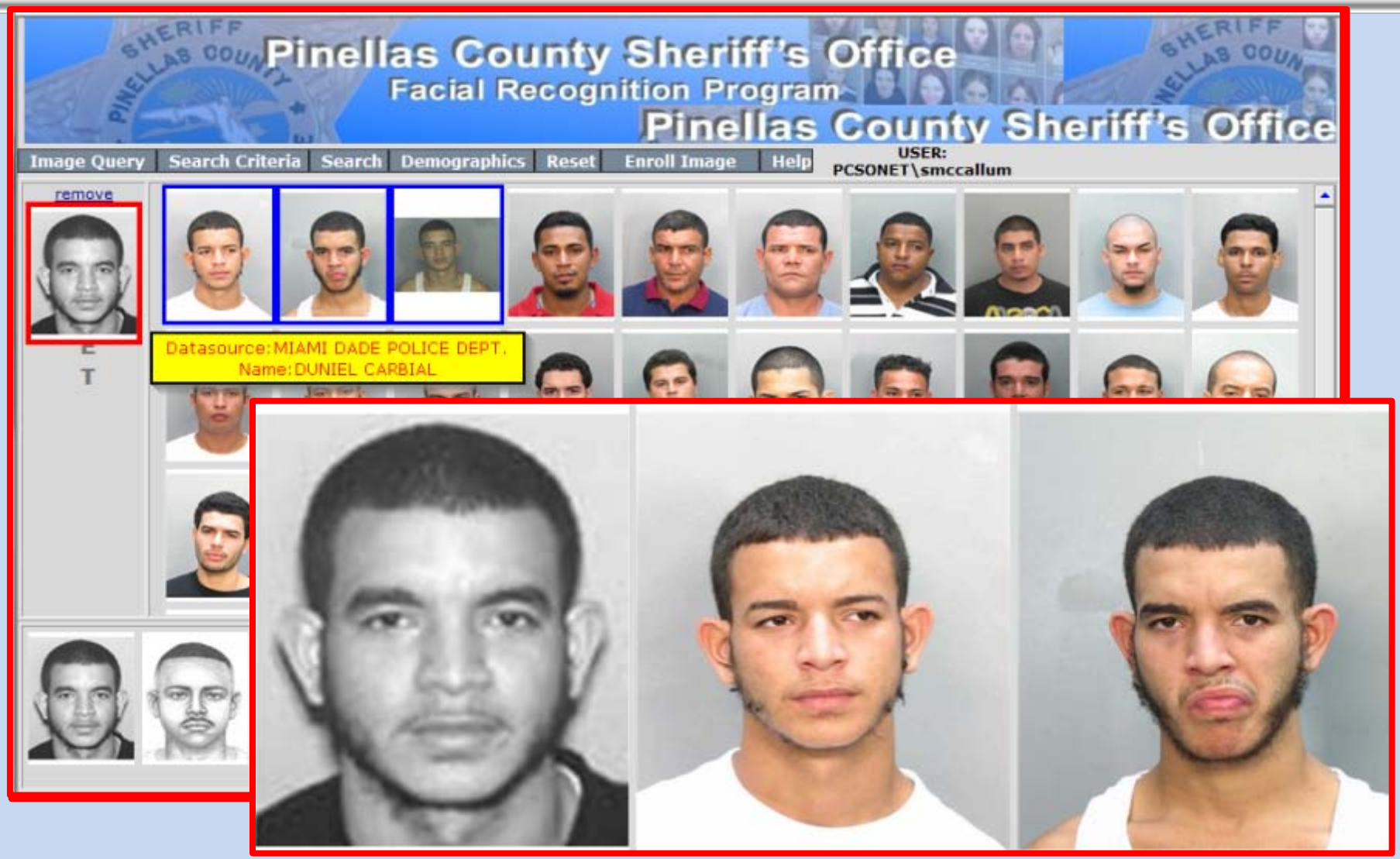
SL# 0

Efforts led by Dr. Anil Jain and Dr. Brendan Klare


Side by side image comparison - Windows Internet Explorer
Zoom In:
30%
Reset
Help
Overlay opacity:
0%
PROBE
TARGET
Done
Local intranet | Protected Mode: Off
100%

Florida case involving 3 composites generated by the same artist from different victims.

PCSO searches composites, but is doubtful on yielding successful results with the current ABIS



Composite searched with binning – no match in top 300

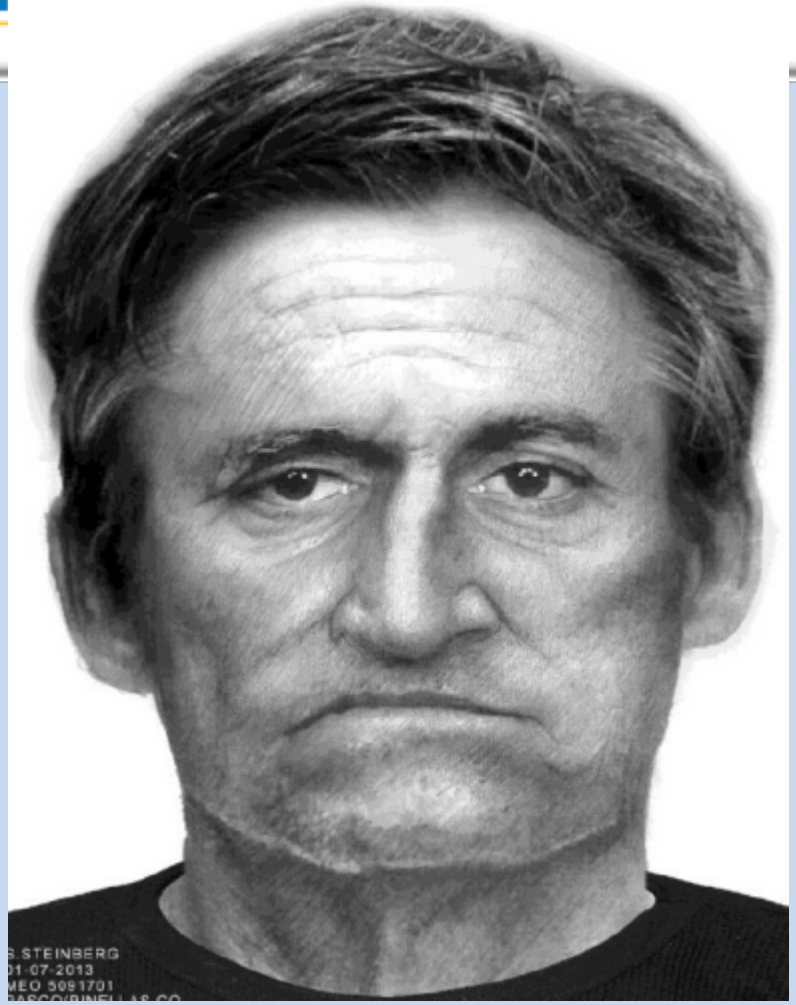
Department of Justice, Community Oriented Policing Services

Project goal:

- Develop law enforcement FR best practices
- Viewed sketch match performance
- Child to adult match performance
- Decedent identification
- Real-time identification against VLDB
- Covert collection and search
- Expand FR in Florida (10 additional agencies)
- Develop new search and comparison tools
- Develop online FR/FI training program
- **Completion: August 2013**

PCSO started decedent searches in 2010 to address:

- ✓ Medical Examiner image collection and quality assessment
- ✓ In field forensic image collection and quality assessment
- ✓ Rapid in field identification
- ✓ Assist with best practices for post mortem image collection



Top Ranking Candidate

Facial Recognition accuracy on composites and sketches is based upon the precision of facial landmark and feature placement. Minute changes in feature set placement can significantly affect FR accuracy. Comparisons between sketch and subject pairs is subjective and for lead purposes.

Images redacted

NO PROBABLE MATCH CANDIDATES FOUND

Reconstructions from post mortem images prove most promising due to retention of core landmark and feature set placement. Post mortem images demonstrate with non-standard image capture as compared to images contained within the FR system. Mugshot/DL images adhere to collection practices that differ from the ME capture process.

Images redacted

POSITIVE IDENTIFICATION FOUND

POSITIVE IDENTIFICATION FOUND

Images redacted

NOMINAL QUALITY	IPD 293 No occlusion	Even illumination On axis	Non-neutral expression

POSITIVE IDENTIFICATION FOUND

Images redacted

GOOD QUALITY	IPD 293 No Occlusion	Even illumination On axis	Neutral expression Individual characteristics

DATE: 2/19/2013

DETAILS: Miami-Dade Police Department Forensic Artist Samantha Steinberg requested assistance with identification of an unknown suicide victim. Ms. Steinberg forwarded the post mortem image and her reconstruction depicting the subject in life. The subject was positively identified from the DHSMV dataset and information immediately provided to the MDPD Detective working the case. Information was also provided to the Medical Examiner's Office since fingerprints were met with negative results.

FACES Facial Gallery With Matches

Images redacted

Original Post Mortem Image and Forensic "In Life" Reconstruction

Matching Images From FACES

Law Enforcement Sensitive

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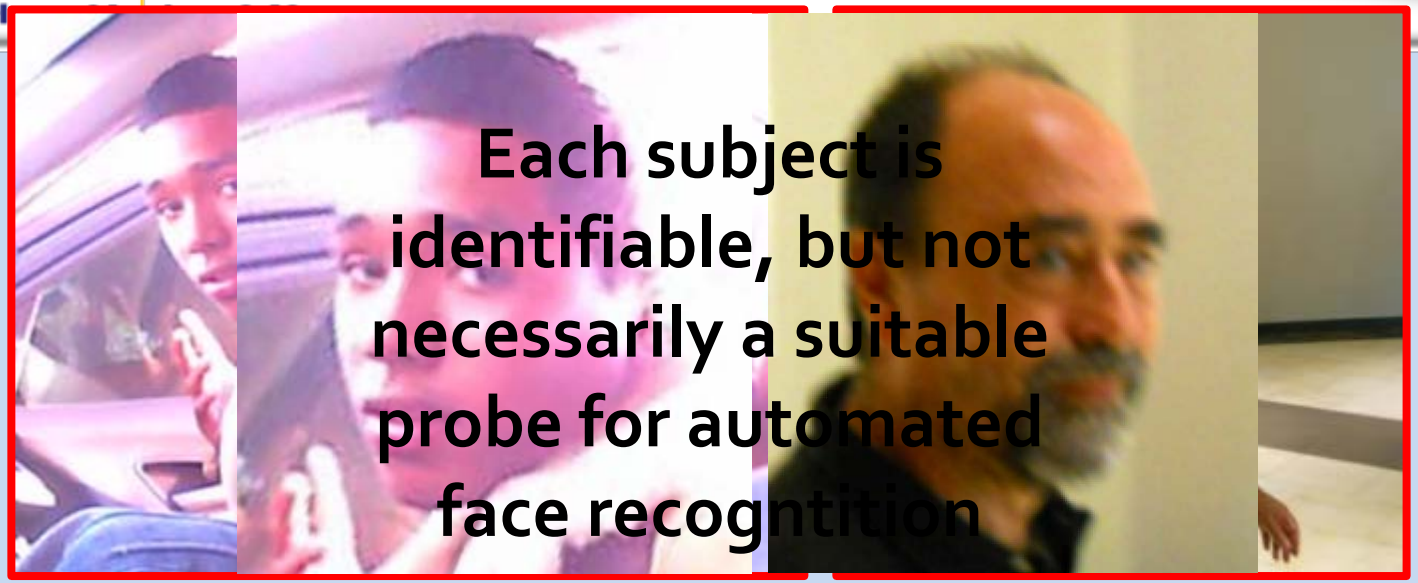
Image Quality Basics

FACES
Face Analysis Comparison & Examination System

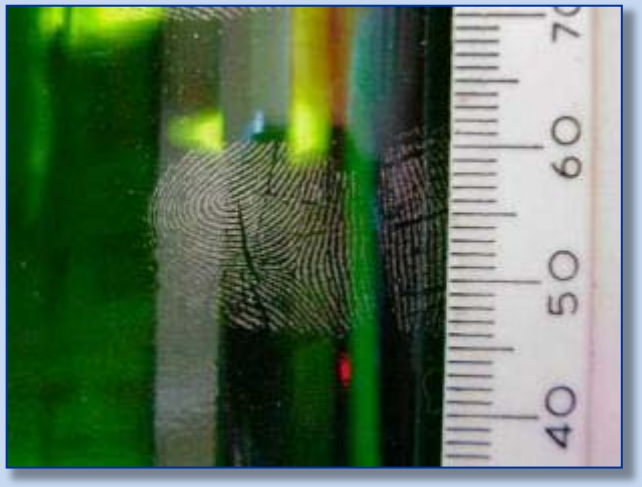

Each subject is identifiable, but not necessarily a suitable probe for automated face recognition

User training and image assessment practices assist with user expectations

Lighting

Sharpness

Pose



Latent Print

Expression

Resolution

Occlusion

- **Lighting**
  If photographing a subject for facial recognition place the flash mode to "Fill Flash" as to reduce daylight shadowing.

- **Pose**
  Subject should demonstrate a relaxed or nuetral facial expression. Smiles and other facial expressions should be dissuaded.

- **Angle**
  Subject should be straight and on axis.

- **Occlusion**
  Facial photos should be unobstructed by hats, glasses, and hair when possible.

Daylight without Flash

Daylight with Flash

Poor pose & angle

Good pose & angle

Aspherical Distortion: The aspherical elements of a lens help compensate for many lens aberrations common in simpler lens designs. Distortion presents in non-spherical lens and may demonstrate distortion at close distances. To compensate for distortion take the image at a minimum distance of 4 feet from subject without a zoom or greater than five feet and with a zoom.

Automated Facial Recognition search outcomes can be significantly affected by aspherical distortion due to the nature of the enrollment/template generation of a distorted probe image. PCSO database images are collected via standardized collection processes and not prone to distortion.

Distorted image < 3 feet | Image at 4 feet | Image at > 4 feet with zoom

Images redacted

DETAILS: Pinellas County Sheriff's Office responded to a non-responsive bicycle accident victim. PCSO deputies took multiple photos of the subject and were advised medical equipment could not be removed. MDPD Forensic Artist Samantha Steinberg assisted with generated a reconstruction of the subject with medical equipment removed. The subject was positively identified from the DHSMV dataset.

Camera #3
10:23:16
01/02/03

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Face Recognition & ICAC

Face Analysis Comparison & Examination System

- ✓ Identify victims depicted in child pornography/prostitution
- ✓ Identify subjects extracted from social media sites
- ✓ Identify subjects extracted from cell phones
- ✓ Identify subjects from escort services advertised on websites
- ✓ Identify subjects captured on video during undercover operations
- ✓ Identify child pornography perpetrators

Images redacted

"During an Internet Cyber Operation involving adults interacting with children an unknown subject was "chatting" with what he thought was a juvenile but in fact an investigator. The investigator wanted to try and identify the subject and only had the web image."

Images redacted

"One of the pictures was good enough to crop the face and utilize for FR. This is the positive result we received."

"Face recognition can assist with victim identification."

Images redacted

"Face recognition can assist with victim identification."

Images redacted

"Face recognition can assist with victim identification."

Images redacted

"Face recognition can assist with victim identification."

Images redacted

"Face recognition can assist with victim identification."

Images redacted

Images redacted

"Backpage.com notified NCMEC believing subject may be a minor. NCMEC forwarded to PCSO ICAC investigator for assistance."

The FACES Application

FACES
Face Analysis Comparison & Examination System

- ✓ FACES is a web-based tool allowing LE to easily enroll and search face images to assist investigations with identification and verification.
- ✓ FACES allows online training to show you the best practices to enroll, search, and compare face images.
- ✓ FACES is user-friendly and directed toward users who are familiar with the Internet Explorer.
- ✓ FACES is available through CJNET
- ✓ FACES is authorized access only

FACES
Face Analysis Comparison & Examination System

Through CJNET's Law Enforcement Links, you can access FACES: www.flcjn.net

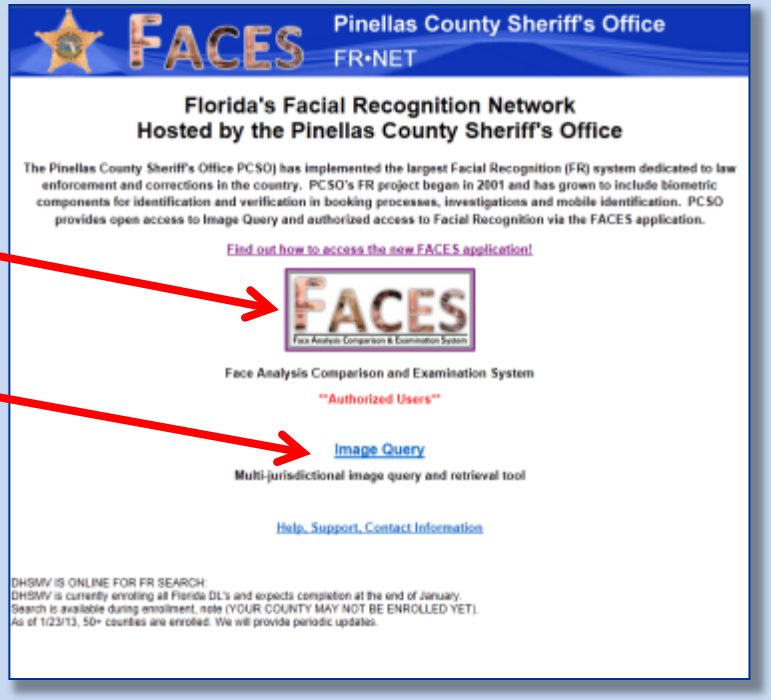
Follow the link for Law Enforcement links (more…) this will take you to the Law Enforcement links page.

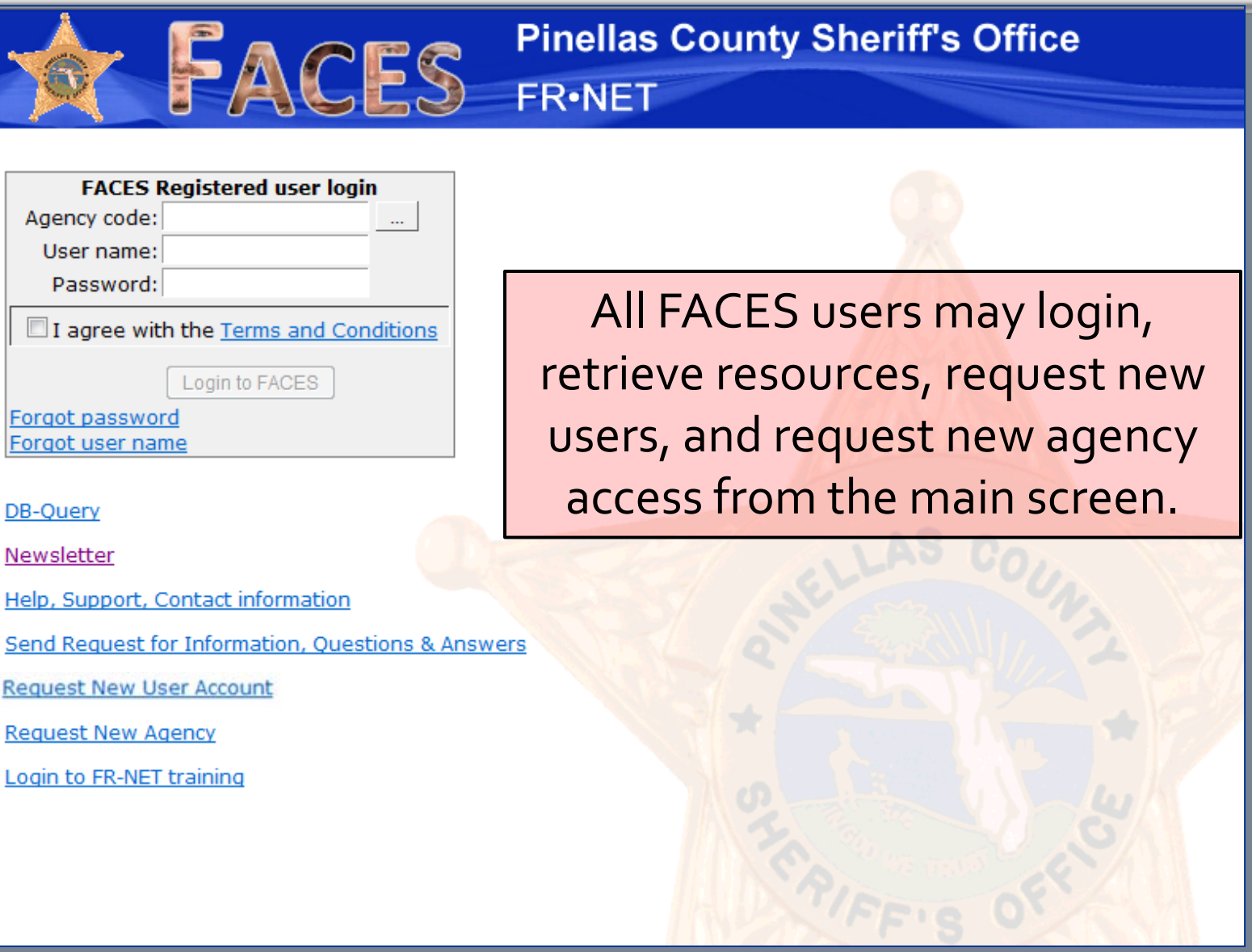
Click "SOPICS - Florida Sheriff's Consolidated Mugshots & Facial Recognition System."

- SOPICS - Florida Sheriffs Consolidated Mugshot & Facial Recognition System Pinellas County Sheriff's Office
- South Florida Investigative Support Center CJNet Site South Florida Investigative Support Center
- Southeast Law Enforcement Information Exchange Naval Criminal Investigative Service
- State and Local Government Information on the Net Piper Resources- Law Enforcement
- Stolen Vessels Florida Fish and Wildlife Conservation Commission
- UCR Data Submission Standards Florida Department of Law Enforcement
- Volusia County Sheriff's Office CJNet Site Volusia County Sheriff's Office

FACES is available to trained authorized users

Image Query is open access and allows demo-graphic data search of all subjects in FACES





All FACES users may login, retrieve resources, request new users, and request new agency access from the main screen.

FACES Pinellas County Sheriff's Office
FR•NET Training

New User account request / FACES Training registration

INSTRUCTIONS:

1. Fill in all information below and submit the form. Upon clicking "submit" you will be redirected to the FACES training user entry page and automatically receive an email with instructions and a key granting access (make sure you put your email correctly).
2. Enter the email provided key to begin the FACES online training. The training content should take you less than 2 hours to complete and will contain questions with multiple choices answers in each module.
3. Upon completion of the FACES online training your username will be automatically generated and emailed to you to begin using FACES.

If you are already registered and have received the training key *click here to enter training*.

New User information form

Select Your Agency: - Select Your Agency -
(If your agency is not on the list above *click here to contact Pinellas County Sheriff's Office* to register your agency first.)

First name:		[required]
Middle name:		
Last name:		[required]
Your Title:		[required]
Your Agency provided email:		[required]
Confirm Your email:		[required]
Your office phone:		
Your cell phone:		

Submit Reset Form

Need help? Click here or call Scott McCallum at 727-453-7193 or Jake Ruberto at 727-453-7893.

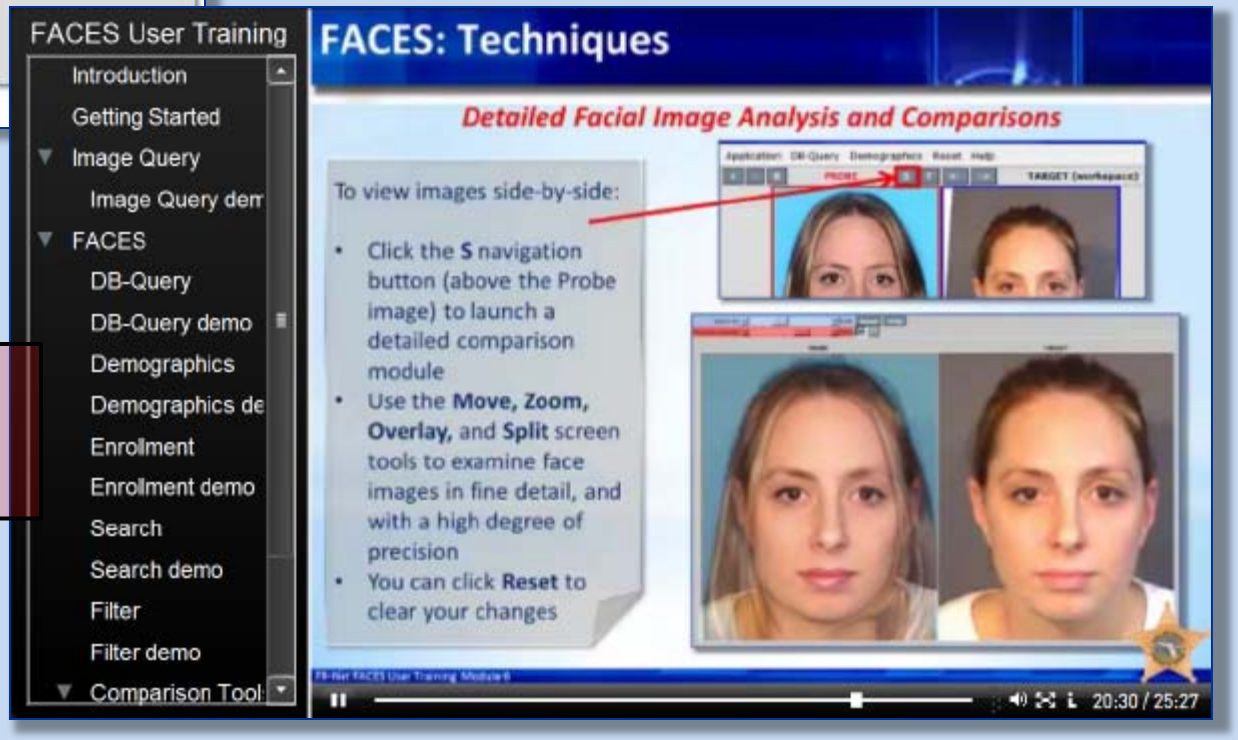
FACES Self-registration for Training Program

New Users may self register for training. If your agency isn't in the agency listing contact Scott.

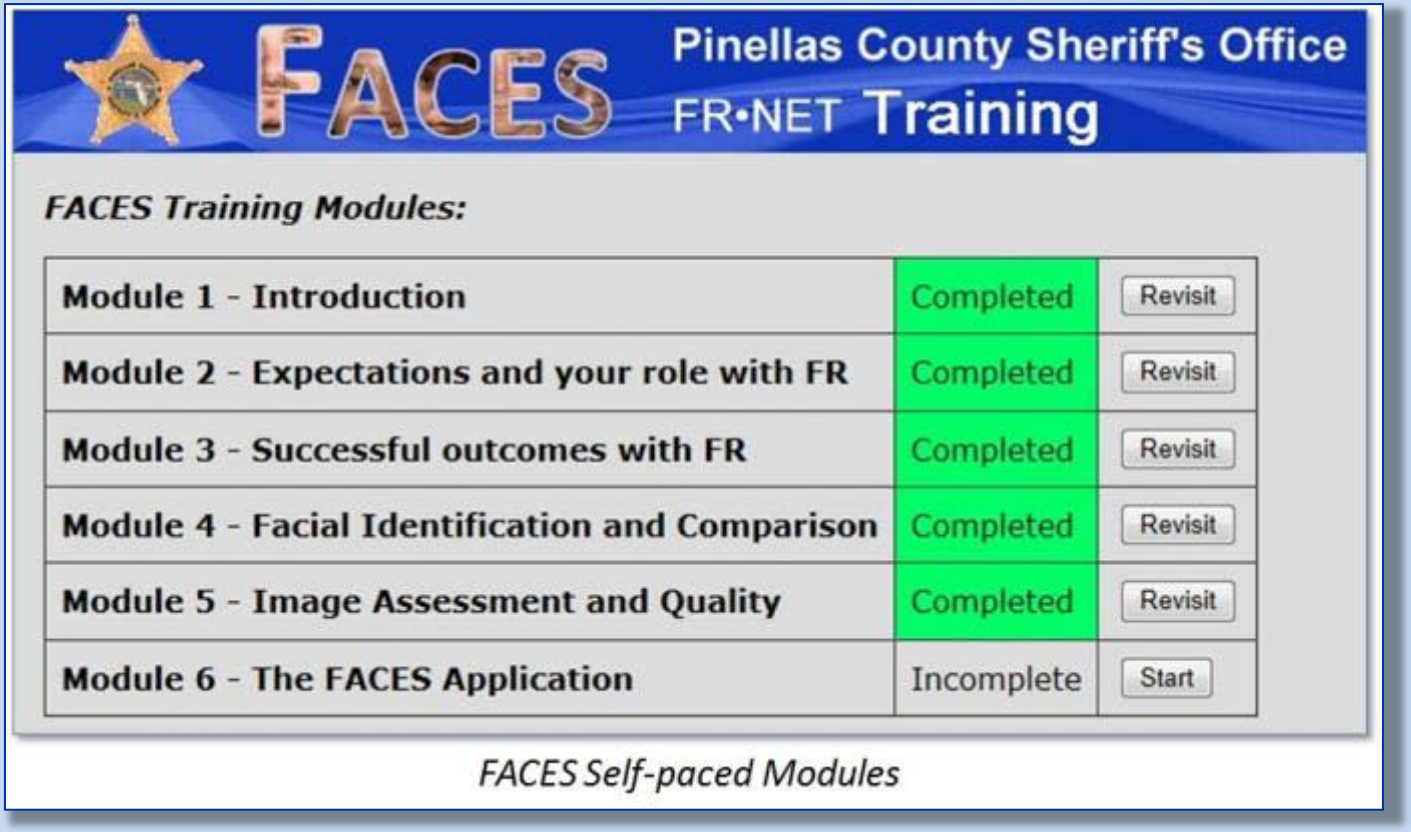
FACES Training Login

Users are provided a key via email to access training.

Online materials instruct on FACES use.



Training consists of 6 self pace modules that may be completed within 15 days of registering.



FACES Self-paced Modules

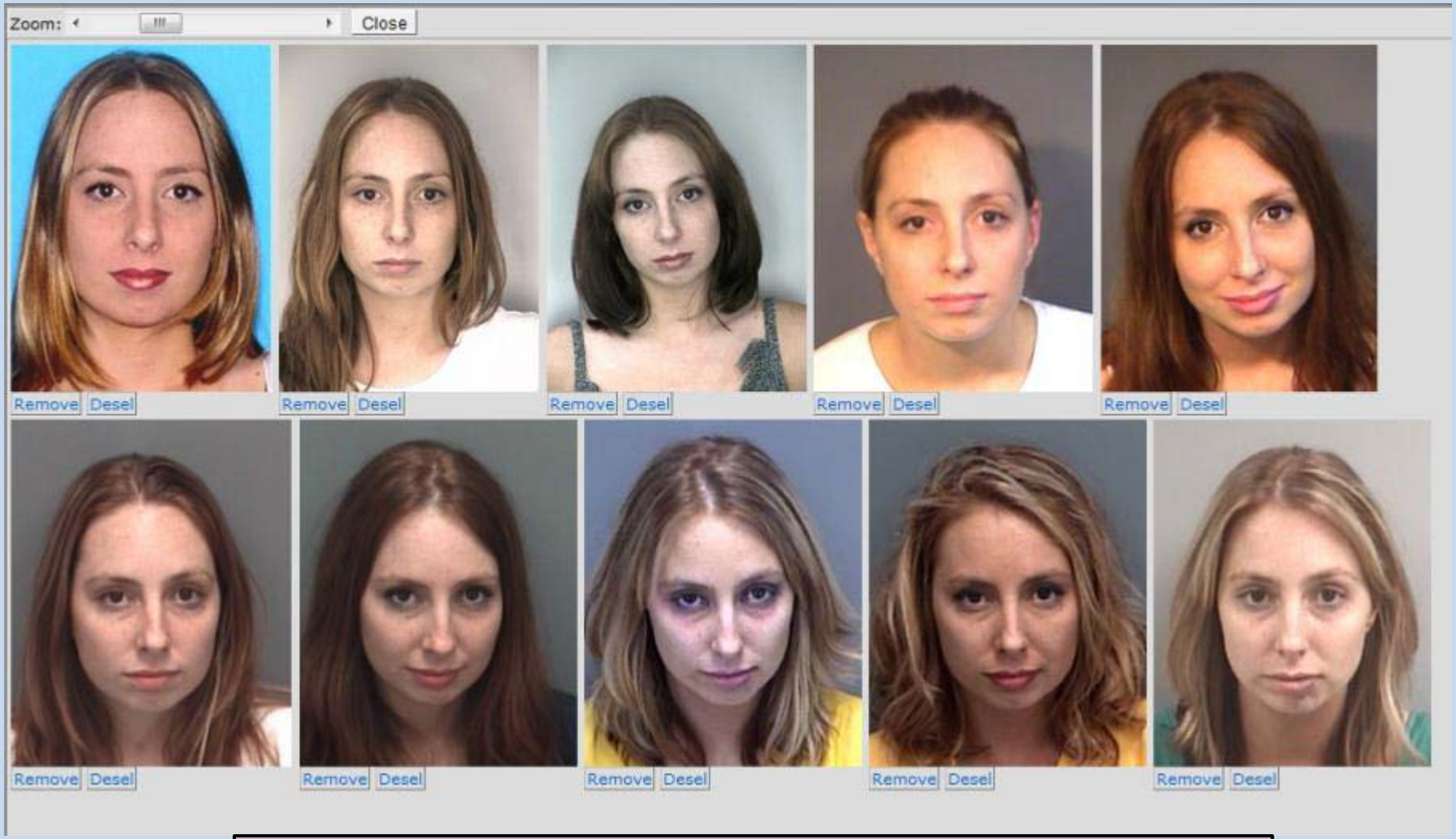
FACES Training Completion

Credentials to access FACES are automatically emailed upon successful completion of training.

All users may print/save a personalized certificate of completion for their records.

FACES Certificate of Completion

Images redacted



Multiple Side By Side Comparison With Scaling

Zoom: Print Close

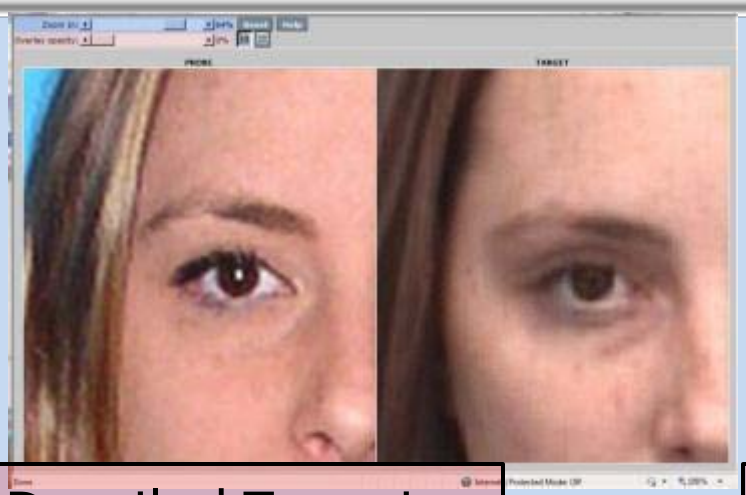
Pinellas County Sheriff's Office

11/26/2012 22:33:10

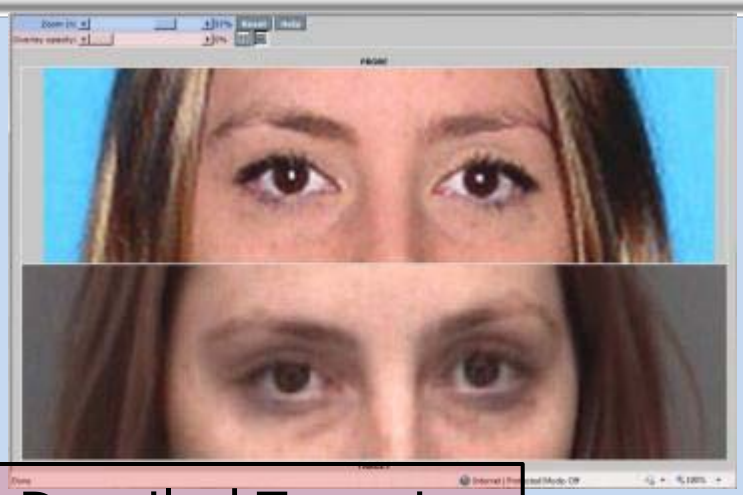
MEGAN E PARSON - Hillsborough County (Partners)

First Name:	MEGAN
Middle Name:	E
Last Name:	PARSON
DOB:	09/06/1981
Gender:	Female
Height:	5' 08"
Weight:	127 lbs
Eye Color:	BRO
Hair Color:	RED
Race:	White
SSN:	
Address1:	
Address2:	PINELLAS CO
City:	ST PETERSBURG
State:	
Zip:	
Country:	
Datasource:	Hillsborough County (Partners)
Image Date:	10/19/2005 00:00:00
Record#:	05068333
ImageID:	I.PA.116011014

Multiple Demographic Details With Scaling, Printing, and Saving

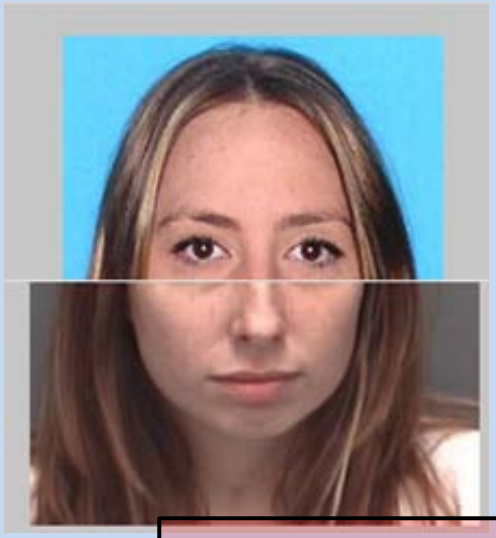


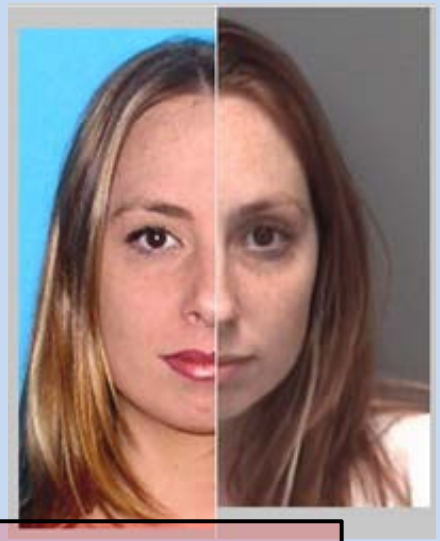
Detailed Zooming



Detailed Zooming

Image Overlay





Split Screen Comparison

2013 region II conference
AAMVA
Atlanta, GA | June 8-13

Face Analysis Comparison & Examination System

Demonstration

DATE: 1/10/2013

DETAILS:

FACES Facial Gallery With Matches

Images redacted

Original Image Provided and Normalized

Side By Side Comparison

DATE: 12/19/2012

DETAILS:.

FACES Facial Gallery With Multiple Matches

Images redacted

Original Image Provided By Det. Lopez

Side By Side Comparison With Similarity Indicators

DATE: 1/8/2013

DETAILS:

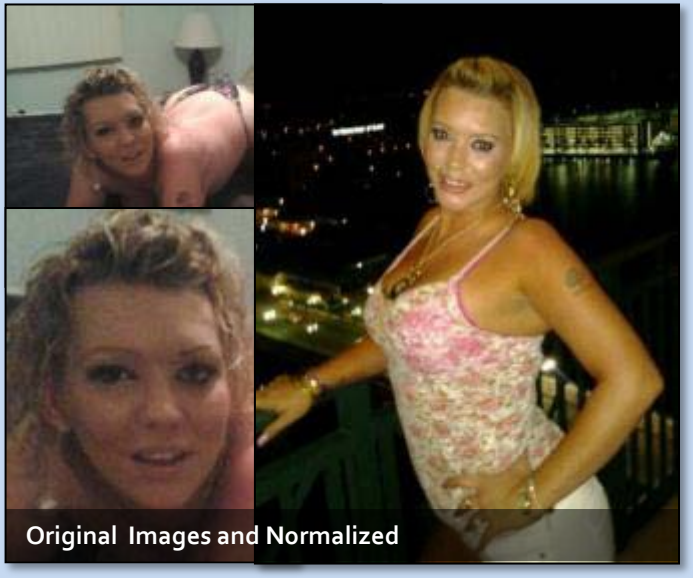
Original Images Provided

Images redacted

FACES Facial Gallery With Match

Side By Side Comparison With Similarity Indicators

FACES Facial Gallery With Matches


Original Images and Normalized

Side By Side Comparison and Tattoo match on subjects

2013 region II conference
AAMVA
Atlanta, GA | June 8-13

DATE: 4/4/2013

DETAILS:

Facebook photos from multiple accounts and normalized probe

Images redacted

FACES Gallery

Side By Side Comparison

Prepared by Scott McCallum

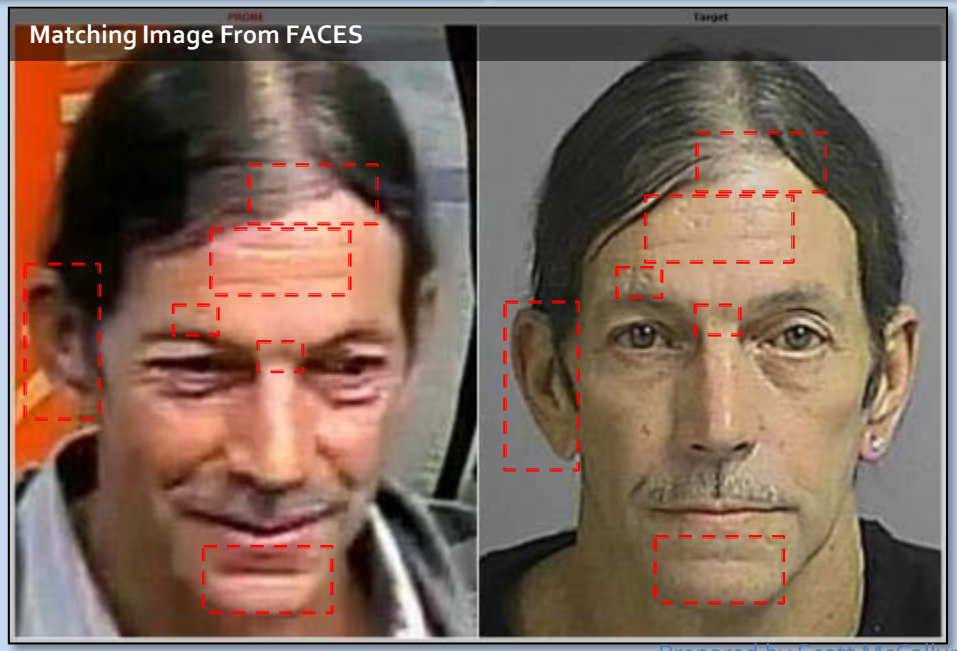
2013 region II conference
AAMVA
Atlanta, GA | June 8-13

DATE: 3/21/2013

DETAILS:

Original Images From Bank Surveillance and Normalized Probe

FACES Gallery With Matches


Matching Image From FACES

Leading The Way For A Safer Pinellas

Prepared by Scott McCallum

DATE: 3/20/2013

DETAILS:

FACES Facial Gallery With Match

Images redacted

Pennsylvania DOT Images Used in Manual Comparison

Original Image and Match Candidate Comparison

DATE: 1/30/2013

DETAILS:

FACES Facial Gallery With Matches

Images redacted

Original Images and Normalized

Side By Side Comparison

DATE: 3/21/2013

DETAILS: PCS

FACES Facial Gallery With Matches

Images redacted

Bolo with iPad images and enhanced image of subject

Side by Side matches

Prepared by Jake Ruberto

2013 region II conference
AAMVA
Atlanta, GA | June 8-13

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FACES
Face Analysis Comparison & Examination System