Federal Bureau of Investigations (FBI)
Criminal Justice Information Services (CJIS) Division

# Needs & Applications of Latents at FBI/CJIS

B. Scott Swann
Supervisory IT Specialist / Software Engineer
New Requirements Group
bswann@leo.gov

**April 5-6, 2006**

**NIST Latent Workshop**

# CJIS Division Mission

The CJIS Division Mission is to

- …..reduce terrorist activities by maximizing the ability to provide timely and relevant Criminal Justice Information to the FBI and to qualified law enforcement, criminal justice, civilian, academic, employment, and licensing agencies concerning individuals, stolen property, criminal organizations and activities, and other law enforcement related data

The CJIS Division mission in 1999 was to

- …..reduce criminal activities by maximizing the ability to provide timely and relevant Criminal Justice Information to the FBI and to qualified law enforcement, criminal justice, civilian, academic, employment, and licensing agencies concerning individuals, stolen property, criminal organizations and activities, and other law enforcement related data

# FBI CJIS Division Assistant Director: Thomas E. Bush III

Thomas E. Bush, III, has served with the Federal Bureau of Investigation since he entered on duty September 8, 1975. Early in his FBI career, he worked in the Identification Division (now the Criminal Justice Information Services Division) and Information Resources Division. He became an FBI Agent in September 1979. Following his agent training, he served at the Washington Field Office from January 1980 to February 1988 where he was assigned Bank Robbery and Fugitive matters. Upon his promotion, he returned to FBI Headquarters to work in the Criminal Investigative Division as a Supervisory Special Agent in the Fugitive/Government Reservation Crimes Unit of the Violent Crime and Major Offender Section. In June 1990, he transferred to the Jackson Field Division as a Field Supervisor until May 1996. His duties in the Jackson Division involved the supervision of Violent Crime, Drug and Civil Rights investigations. He then relocated to the Atlanta Field Division upon his promotion to Assistant Special Agent in Charge and served in that capacity until July 2000. On July 31, 2000, he was promoted to the position of Section Chief, Programs Development Section, Criminal Justice Information Services Division. On August 13, 2002, he was appointed Special Agent in Charge, St. Louis Field Division. On December 23, 2004, Director Mueller appointed him Assistant Director of the Criminal Justice Information Services Division.

# CJIS Division

- CJIS is the largest division of the FBI with ~3000 employees
- The Integrated Automated Fingerprint Identification System (IAFIS) is the largest biometric database in the world and is the National Repository for all automated criminal and civil records
- Prior to 1999 a suspect was needed in order to identify a latent print and a processing time took months to over a year. Today, IAFIS processes latent searches in less than an hour and has a 10% ident rate on cases and 2% on latent searches

# IAFIS Repositories

- Criminal Master File (CMF) 51 Million Subjects
- Civil File 11.6 Million Subjects
- Unsolved Latent File (ULF) 100,000 Subjects
  - Total Capacity 250,000 Subjects
- Special Latent Cognizant File (SLC) is a manually concentrated subset of the CMF and consists of 35 separate files with a total capacity of 1,500,000 Subjects (i.e. Terrorists, Disaster Victims, Serial Crimes etc…)

# IAFIS Repositories

- IAFIS Ten-Print Criminal Master File (CMF) Searches are required to return responses within 2 hours
  - *Average response time is 15 minutes*
- IAFIS Ten-Print Civil File Searches are required to return responses within 24 hours
  - *Average response time is 3 hours and 30 minutes*
- IAFIS Latent Searches are required to return responses within 24 hours
  - *Average response time is 1 hour*

# Latent Searches

- The current latent searches are:
  - 9% Internal - FBI Lab/Latent Print Unit
    - *Approximately 764 per month*
  - 18% Federal Agencies – OFO's
    - *Approximately 2150 per month*
  - 73% States
    - *Approximately 7350 per month*

# Internal Latent Users

- **Since 7/28/99 IAFIS start-up**
  - **FBI Laboratory Division Latent Print Unit has made over 1301 identifications against 1089 individuals in 807 investigations**
    - ***Domestic/International Terrorism, Weapons of Mass Destruction, Homicide, Drugs, Rape, Bank Robbery, Financial Institution Fraud, Extortion, Organized Crime, Unknown***

# Remote Latent Users

- Over 100 originating agencies with latent connectivity to FBI-IAFIS
- Majority of remote latent searches come from 80 various International, Federal, State, and Local Users
- Remote Latent Users (Other Federal, State and Local Law Enforcement Latent Users) submit approximately 9500 Latent Searches a month

# Remote Latent Users

- Largest Agencies include:
  - Texas 2900 a month
  - New York 1800 a month
  - US Postal 975 a month
  - California 650 a month
  - Florida 550 a month
  - Pennsylvania 500 a month
  - USSS 400 a month

# Latent Accuracy

- Basic Demonstration Model (BDM)
- IAFIS Requirements
- National Fingerprint-based Applicant Check Study (N-FACS) Latent Testing

# N-FACS Latent Test

- This test was intended to study the impact of searching latent submissions should file retention ever incorporate the storage of flat fingerprint images within the IAFIS repositories
- Latents previously idented on an FBI record were provided to CJIS from the New York State Division of Criminal Justice Services (DCJS) (67 latents) and the United States Secret Service (USSS) (304 latents)
- Additionally, the NIST Special Database 27 was used as a resource for latent submissions (250 latents)

# N-FACS Latent Test (Cont.)

- Each ten-print rolled record associated with the latents collected were extracted from the IAFIS Criminal Master File (CMF)
- Both the rolled fingerprint images and the segmented flat impressions from each ten-print rolled record was seeded into the IAFIS Non-Operational Environment (NOE)
- The 621 latents collected were resubmitted to the IAFIS NOE optimistically anticipating both the seeded rolled and flat mates would be returned in the respective candidate list

# Latent-Results

| NIST SPECIAL DATABASE 27 (Good, Bad, &Ugly) | |
|---|---|
| Hit only roll | 56 |
| Hit only flat | 17 |
| Hit both roll higher score | 46 |
| Hit both flat higher score | 34 |
| Miss both rolled and flat | 97 |
| Total Submissions | 250 |
| **Rolled TAR** | **54.4%** |
| **Flat TAR** | **38.8%** |

# Latent-Results

| Secret Service Summary | |
|---|---|
| Hit only roll | 91 |
| Hit only flat | 9 |
| Hit both roll higher Score | 115 |
| Hit both flat higher score | 98 |
| Miss both rolled and flat | 0 |
| Total Submissions | 313 |
| **Rolled TAR** | **97.1%** |
| **Flat TAR** | **70.9%** |

# Latent-Results

| New York DCJS Summary | |
|---|---|
| Hit only roll | 45 |
| Hit only flat | 7 |
| Hit both roll higher Score | 39 |
| Hit both flat higher score | 33 |
| Miss both rolled and flat | 1 |
| Total Submissions | 125 |
| **Rolled TAR** | **93.6%** |
| **Flat TAR** | **63.2%** |

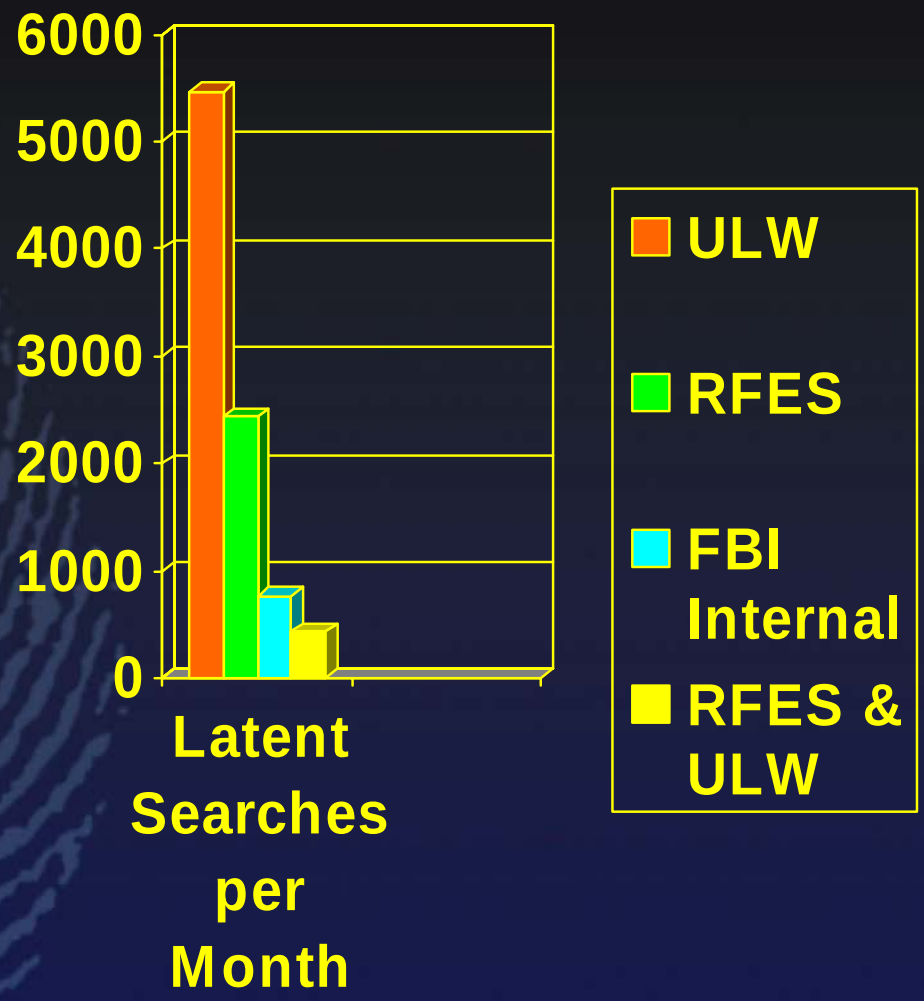
# Next Generation Identification (NGI)

Enhancements to Latent Services within the Next Generation Identification (NGI) was not identified as an individual initiative during the requirements canvass.

- Need for the FBI CJIS Programs Development Section to develop a national latent strategy which would address issues such as the following:
  - Reassess daily latent search capacity and current limitation policy (Currently being addressed)
  - Training (Currently being addressed)
  - Integration of ULW and RFES software to leverage the best possible features and address new NGI latent functionality
  - Develop a National Marketing Plan for Latent Services

# Software Applications

- ULW Latent Users
  - 69% of Total Searches
  - AZ, CA, CO, DC, FL, GA, HI, ID, IL, IN, MA, MD, ME, MI, MN, MO, MS, MT, NV, NH ND, OH, OK, OR, SC, TX, VA, WA, WI
- RFES Latent Users
  - 31% of Total Searches
  - AL, CT, KS, IA, NB, NC, NJ, NY, SD, WV
- FBI LPU utilizes the Internal IAFIS Latent Provider Workstations
- States that use both RFES and ULW
  - LA,PA,TN



# Latent Requirements

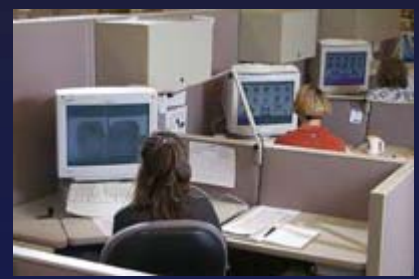
NGI Canvass - 150 Total Latent Services Requirements

Training - 20 requirements

every crime lab interviewed requested additional latent training

Latent Penetration - 11 requirements

Analysis required in regards to raising penetration for latent searches



ULW Print Capabilities - 7 requirements

Deployment - July 2006

Daily Search Allocations - 6 requirements

Immediate change with no down time

# Latent Daily Search Allocations

- Each State, Other Federal Organization (OFO), and the FBI have a given number of searches per day. In addition, a 5 day wait queue for each agency is in place to stage additional searches to be processed in IAFIS. The latent users only exceeds their allocation when they have more than their 5 day allotment of searches queued in the system at one time. With the current rapid processing of latent searches, the allocations are only exceeded when an agency “batches” their workload to be sent to IAFIS.

# Latent File Penetration

Are ample computing resources within IAFIS alone enough to justify the removal of the 30% file penetration requirement?

NO! Remember Accuracy

# Next Generation IAFIS

- **Advanced Fingerprint Identification Technology (AFIT)**
  - **Improve the latent processing services**
    - **Variable resolution**
    - **The capability to overlay AFIS feature vectors into the image retrieved from the Fingerprint Image Master File (FIMF) and the Unsolved Latent File (ULF).**
    - **Giving the users the capability to provide decision information on latent comparisons performed against all latent candidate results.**
    - **Giving remote users the capability to retrieve images from the ULF.**

# Next Generation IAFIS

- **Enhanced IAFIS Repository (EIR)**

  - Redesign and consolidate civil and criminal repositories (fingerprint image, fingerprint vector, and biographical data) to provide complete interoperability, implementing single subject identity and providing full range of capabilities needed to maintain them.

# National Palm Print Service


## FBI Palm Service will serve as the National Palm Repository

- Fully Integrated within IAFIS
- Primary customers include FBI Laboratory Division and other federal, state and local law enforcement agencies
- Functionality
  - Receive, Store, & Search Palm Prints
    - Including Major Case Prints
  - Allow Bulk Submissions
  - Search Unsolved Latent File
  - Multi-modal
- Benefits
  - Additional Biometric
  - Solve More Crimes

# Standardize Major Case Collection

- A systematic recording of all of the friction ridge detail appearing on the palmar sides of the hands. This includes the extreme sides of the palms, and joints, tips and sides of the fingers.

*Recommendation primarily provided in September 2005 by:*

SWGFAST

Scientific Working Group on Friction Ridge Analysis, Study and Technology

*Also worked very close with NIST to define SWGFAST business requirements into the standard.*

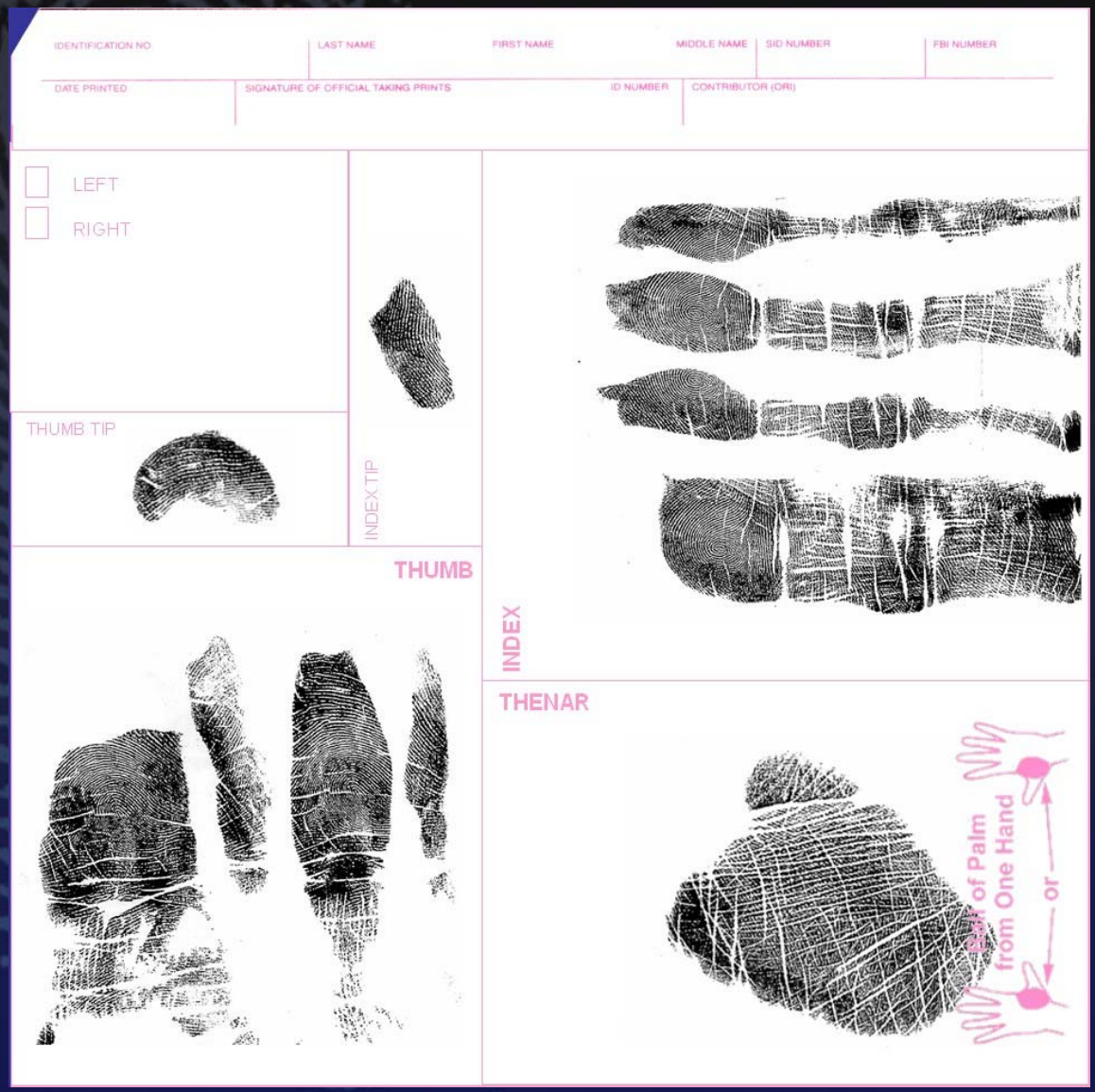
# Standardize Major Case Collection

- A Standard Major Case Print Card Collection Shall Consist of:
  - 1 – FBI Standard Fingerprint Card
  - 2 – IAI Standard Palm Print Cards (1 Card Per Hand)
  - 2 – Newly Defined Major Case Card ( 1 Card Per Hand)

A Total of 5 Cards Per Subject.

# Major Case Card Front

(With Example Images)

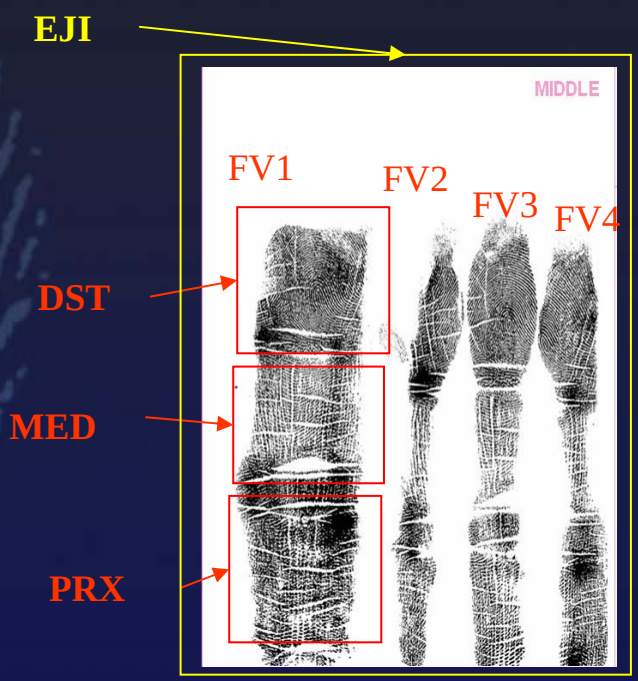


# Major Case Card Back

(With Example Images)

# Table 6.1 Major Case Print Codes

| Type of Major Case Print Image | Image Code |
|---|---|
| Entire Joint Image | EJI |
| Rolled Tip | TIP |
| Full Finger View | FV*x* *x* = {1,2,3,4} |
| Proximal, Distal, or Medial Segment | PRX, DST, MED |



# Table 5 – Finger impression type

(Proposed Table)

| Description | Code |
|---|---|
| Live-scan plain | 0 |
| Live-scan rolled | 1 |
| Nonlive-scan plain | 2 |
| Nonlive-scan rolled | 3 |
| Latent impression | 4 |
| Latent tracing | 5 |
| Latent photo | 6 |
| Latent lift | 7 |
| Live-scan vertical swipe | 8 |
| Live-scan optical contact plain | 20 |
| Live-scan optical contact rolled | 21 |
| Live-scan non-optical contact plain* | 22 |
| Live-scan non-optical contact rolled | 23 |
| Live-scan optical contactless plain | 24 |
| Live-scan optical contactless rolled | 25 |
| Live-scan non-optical contactless plain | 26 |
| Live-scan non-optical contactless rolled | 27 |
| Other | 28 |
| Unknown | 29 |

# Next Generation IAFIS

A **Multi-modal Biometric** framework within the Next Generation IAFIS Program was not identified as an individual initiative prior to the initial requirements effort. The overall multi-modal biometric concept would be as follows:

- The ability to accept and store additional biometric information (Iris, Facial, Voice)
- The ability to search additional biometric information independently by modality
- The study of fusion within IAFIS to combine the results of various biometric modalities

# NGI Summary

- Next Generation IAFIS (NGI) will be supporting several enhancements to the existing IAFIS latent functionality
- A National Palm Print System will be established within IAFIS which will mirror existing IAFIS latent services
- IAFIS will enable latent users to search the Civil File and retrieve images from the Civil and Unsolved Latent Files
- Additional development of the Special Latent Cognizant Files for OFO's and Remote Latent Users
- Enhancements to latent advanced image tools and search algorithms within IAFIS
- In addition to NGI, CJIS has established an Interoperability Team who is working with DHS/US Visit and DOS to further develop the interoperability between IDENT and IAFIS

# Interoperability

- Interoperability between DHS's IDENT system and FBI's IAFIS
  - Formed Integrated Project Team in May 2005
    - Established Guiding Principles
  - Developed business requirements and concept of operations--October 2005
  - Analyzing technical alternatives--December 2005
    - Shared Services
    - Shared Data
    - Single Service
  - Performing cost benefit analysis –January 2006
  - Developing interim solution—Available September 2006
    - Reciprocal exchange of information
      - Wants and Warrants from FBI
      - Recidivists with Alerts from DHS and Visa Critical Refusals from DOS
  - On 11/17-18/2005, DHS, DOS, and FBI participated in an off-site to discuss and resolve key issues regarding interoperability

# Phased Development of Interoperability

- **iDSM**
  - Interim Solution
  - Based on hybrid of Shared Data and Shared Services
  - Limited data set
    - Wanted Persons
    - Recidivists w/Alerts
    - Visa Denials
  - Available FY06

**BRIDG**

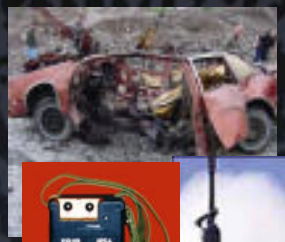
- Biometric Reciprocal Identification Gateway
- Solution to be decided
- 2 Phases
  - Initial Operating Capability (IOC)
    - Minimal search capacity
    - FY08
  - Full Operating Capability (FOC)
    - Reengineer search solution consistent with Next Generation IAFIS
    - FY10

# Fingerprints in the Global War on Terror

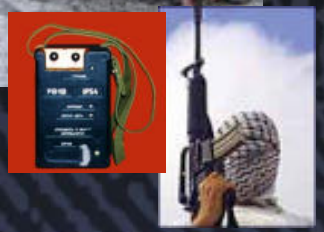
## Department of Defense (DoD) Connectivity

- The FBI has partnered with the DoD in order to acquire and share identification data collected on individuals of national security interest.
- The CJIS Division has assisted DoD in the research and development of an Automated Biometric Identification System (ABIS) to support the U.S. Military in consolidating, formatting, and exchanging identification information.
- ABIS provides DoD with the ability to gather, store, and enter identification data into the Integrated Automated Fingerprint Identification System, which allows the FBI to further share this information with other government and law enforcement agencies.

# Fingerprint Processing and the DoD ABIS Enterprise Approach

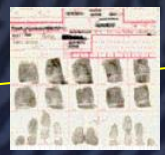


Terrorist/Crime Scene



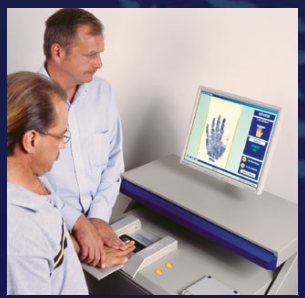
Latent prints

Detainee Processing

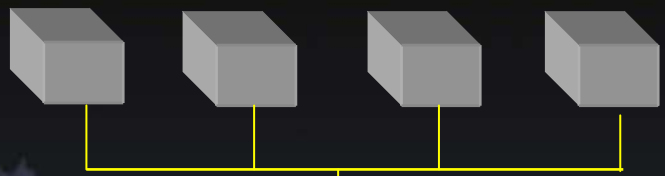


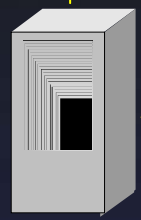
Ten-print rolled

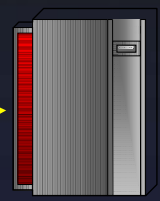
Ten-print rolled



Gray Force Processing







DoD ABIS

FBI CJIS IAFIS



~51M Records

# Summary

- Shared Data or Services Model
  - Need for, feasibility of, a global controlled access, shared biometric data repository.
  - System whereby allied law enforcement and intelligence agencies may contribute, access, and query selected biometric data information for KSTs.
- Shortage of Latent Examiners
  - Investigate innovative approaches to ensure the man-power exists to utilize AFIS
  - Better tools
  - Develop Quality Metrics (Good, Bad, Ugly)
- Improve Latent Reliability within AFIS
  - Benchmark Vendor Capabilities (Fusion of approaches)
  - Extended Feature Set

# QUESTIONS?

B. Scott Swann
Supervisory IT Specialist
Software Engineer
FBI/CJIS
304-625-2477
bswann@leo.gov

Jeff Carlyle
Latent Liaison
Information Technology Specialist
FBI/CJIS
304-625-2474
jcarlyle@leo.gov