



# Update on the U.S. National DNA Database

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- ◉ Overview of the FBI's plan for Rapid DNA
  - Thomas Callaghan, Senior DNA Scientist
  
- ◉ Overview of the Operation of the US National DNA Database (NDIS)
  - Douglas Hares, NDIS Custodian



## Brief Chronology

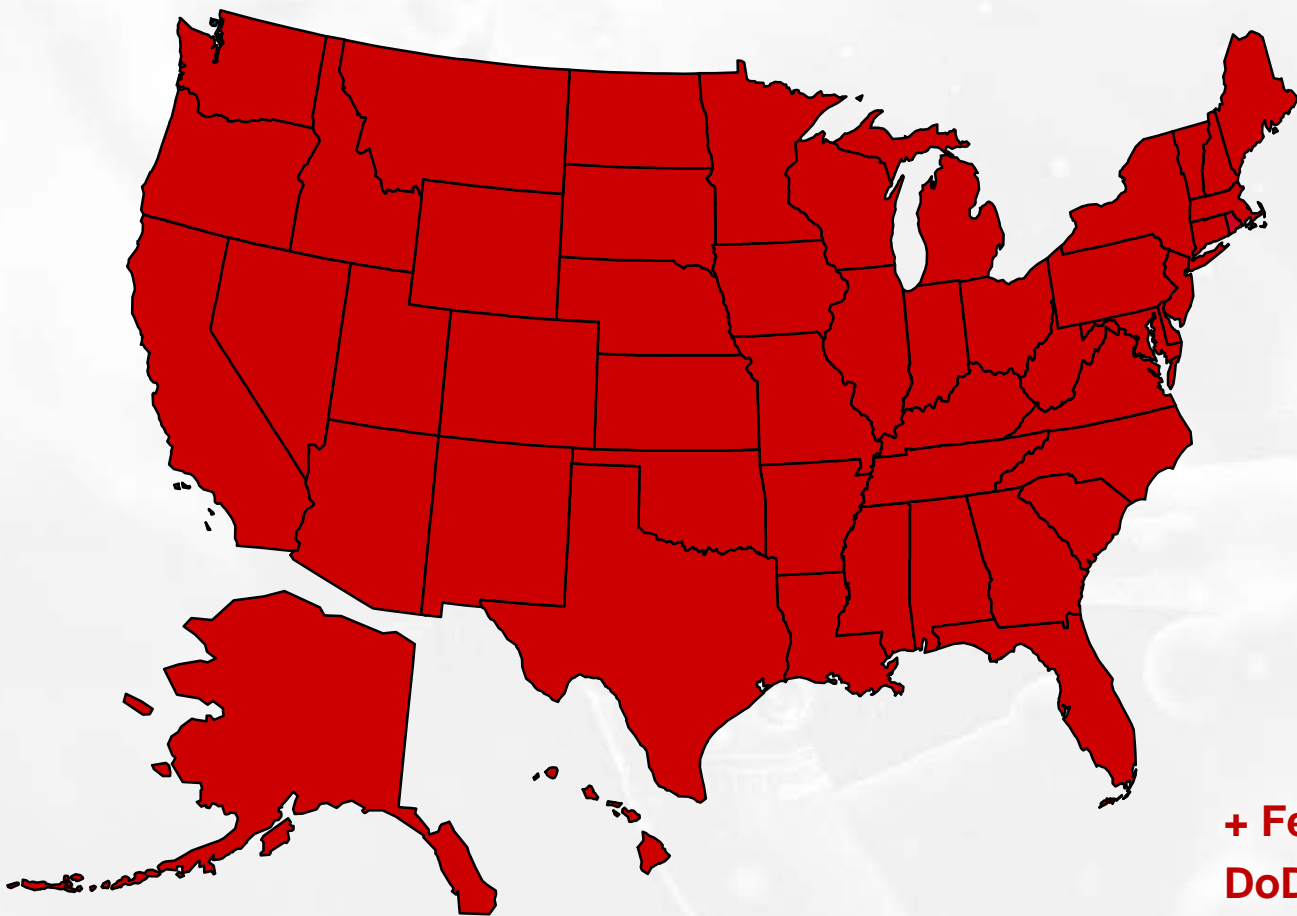
- **1990** – CODIS software pilot project - 14 state and local labs
- ***DNA Identification Act of 1994*** - FBI's authority to establish a National DNA Index System (NDIS)
  - Created DNA Advisory Board to develop Quality Assurance Standards for Forensic DNA laboratories.
- **1996** – Publication of Privacy Act Notice for NDIS
  - Law Enforcement Identification markers only
  - No personally identifiable information stored in database
- **October 1998** - FBI's NDIS became operational with 9 states participating
- ***DNA Analysis Backlog Elimination Act of 2000*** – Authorizes collection of DNA samples from Federal offenders (FCO)
- ***Justice for All Act of 2004*** – Accreditation Requirement, QAS Audit Requirement, Indicted Persons at NDIS, All Felonies for Federal Program, Increase Penalties for Unauthorized Disclosure
- ***DNA Fingerprint Act of 2005*** – Arrestees & Legally (state law) Collected Samples at NDIS, Arrestees and Detainees for Federal Program; prohibition of samples used for elimination purposes



# DNA Sample Collections in the United States



# All Felonies (All states)



**+ Federal,  
DoD & D.C.,**





# States with Arrestee Collection Laws

|                          |                                                                                                                |
|--------------------------|----------------------------------------------------------------------------------------------------------------|
| <b>Alabama</b>           | Arrest for <i>any felony</i> or sexual offense                                                                 |
| <b>Alaska</b>            | All crimes against a person, <i>felonies under the Criminal Code</i> , offenses relating to alcohol            |
| <b>Arizona</b>           | Homicide, sex-related offenses, burglary, prostitution and incest                                              |
| <b>Arkansas</b>          | <i>All felony arrests (2015)</i>                                                                               |
| <b>California</b>        | <i>All felony arrests (2009)</i>                                                                               |
| <b>Colorado</b>          | Arrests for <i>a felony offense</i> or the investigation of a felony offense                                   |
| <b>Florida</b>           | Arrests for homicide, assault, sex offenses, lewdness (2011) <i>phasing in to all felony arrests in 2019</i>   |
| <b>Illinois</b>          | Arrest for murder, home invasion, and criminal sexual assault                                                  |
| <b>Indiana</b>           | <i>All felony arrests</i> (Effective January 1, 2018)                                                          |
| <b>Kansas</b>            | <i>All felony arrests</i> (July 2008)                                                                          |
| <b>Louisiana</b>         | <i>All felonies &amp; sex-related misdemeanor offenses</i>                                                     |
| <b>Maryland</b>          | Arrest for crimes of violence and burglary or attempts                                                         |
| <b>Michigan</b>          | <i>All felony arrests</i>                                                                                      |
| Minnesota*               | Arrest for certain felonies (murder, assault, robbery, kidnapping, criminal sexual conduct)                    |
| <b>Missouri</b>          | Felony arrests for offenses against a person, sex offenses, family offense, burglary, prostitution, etc...     |
| <b>Mississippi</b>       | Arrests for crimes of violence effective July 1, 2014 if sufficient funding                                    |
| <b>Nevada</b>            | <i>All felony arrests</i> (July 2013)                                                                          |
| <b>New Jersey</b>        | Arrest for murder, manslaughter, assault, , luring a child, sexual assault and sexual contact or attempts      |
| <b>New Mexico</b>        | <i>All felony arrests</i> (July 2011)                                                                          |
| <b>North Carolina</b>    | Arrest for murder, manslaughter, sex offense, assault, kidnapping, burglary, arson, robbery, stalking          |
| <b>North Dakota</b>      | <i>All felonies</i>                                                                                            |
| <b>Ohio</b>              | <i>All felony arrests</i>                                                                                      |
| <b>Oklahoma</b>          | Arrest for <i>a felony offense</i> and arrest of any alien unlawfully present under Federal Immigration Law    |
| <b>Rhode Island</b>      | Arrest for a crime of violence (July 1, 2015)                                                                  |
| <b>South Carolina</b>    | <i>All felonies</i> or offenses punishable by a sentence of 5 years or more and eavesdropping, peeping, etc... |
| <b>South Dakota</b>      | Arrest for <i>all felonies</i> , crime of violence or violation of Sex Offense Chapter                         |
| <b>Tennessee</b>         | Arrest for violent felony offenses                                                                             |
| <b>Texas</b>             | Indicted for certain sex-related felony offenses                                                               |
| <b>Utah</b>              | Arrest for violent felony offenses; <i>All felony arrests effective January 1, 2015</i>                        |
| <b>Virginia</b>          | Probable cause determination by magistrate for violent felony offenses                                         |
| <b>Wisconsin</b>         | Arrests for violent felony offenses ( <i>Effective April 1, 2015</i> )                                         |
| <b>Federal &amp; DoD</b> | <i>All felonies</i>                                                                                            |
| <b>Puerto Rico</b>       | Serious felonies (murder, sexual assault, kidnapping, assault, burglary, etc...)                               |



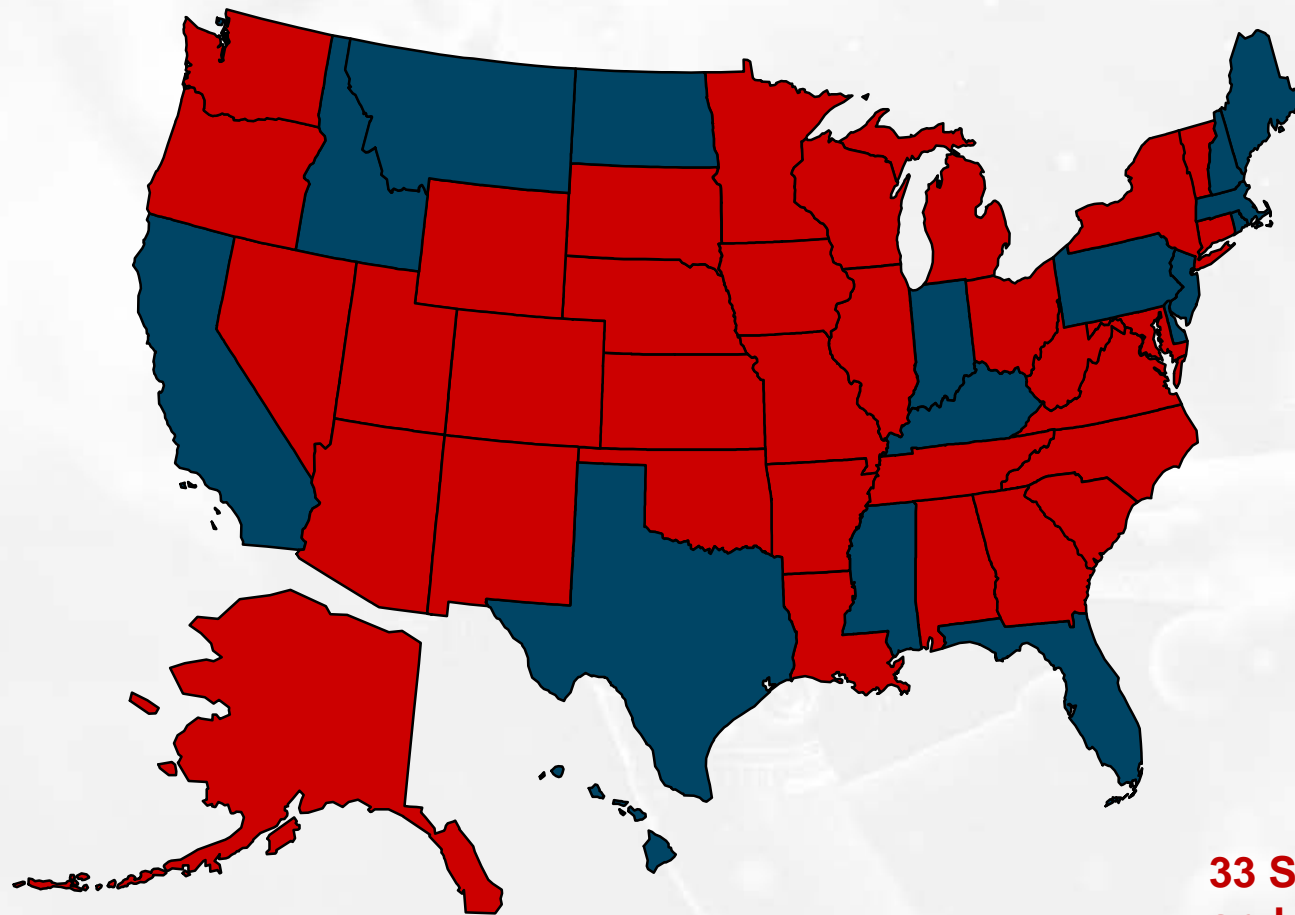
## 2016 Sample Collection/analysis

| Arrest or Booking                                                              | Arraignment/Indictment/<br>Warrant<br>(Probable cause)                    |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| AL, AK, AZ, AR, CA,<br>FL, KS, LA, MI, MO,<br>MS, NJ, ND, OH,<br>SC, SD<br>Fed | CO, IL, IN, MD, NV,<br>NM**, NC, OK, RI, TN,<br>TX, UT, VA, WI<br><br>*MN |





# Misdemeanor Collections (in red)



**33 States, Federal,  
and DoD**



## Trends in State DNA Legislation

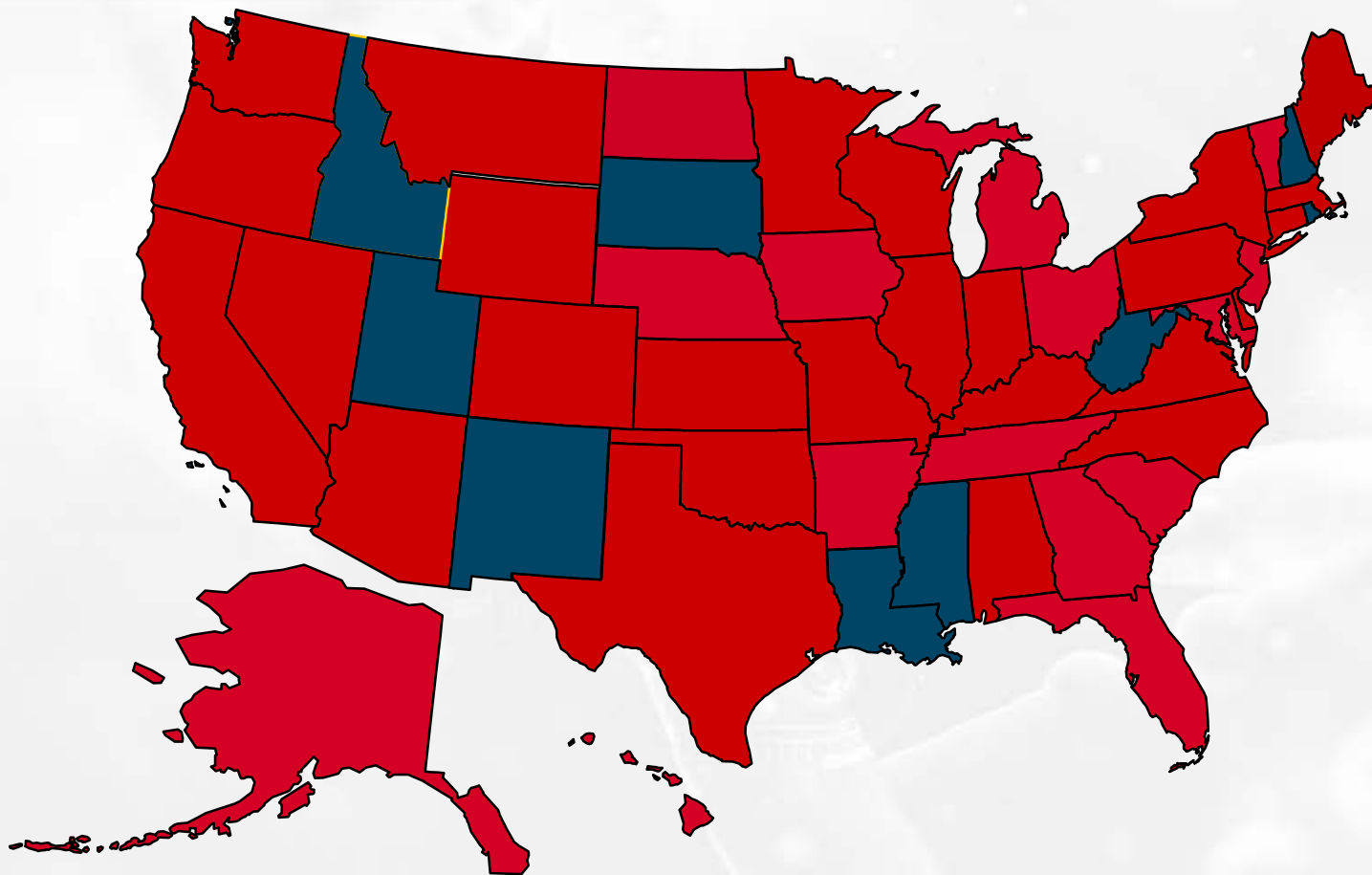
- To expand the scope of collections to include:
  - Persons arrested for felony level offenses
  - Persons convicted of misdemeanor level offenses
  - Juveniles
  - Retroactive collection for those incarcerated and on parole/probation
- To address sexual assault evidence kit processing (required kit submission and laboratory analysis times)



# Constitutional Challenges to DNA Databases



# Federal & State DNA Sample Collection Challenges





## Federal & State Litigation

- Over 225 cases relating to the constitutionality of Federal and State DNA databases
  - All found constitutional
- Representing 42 States and the District of Columbia
- All **thirteen** Federal Circuit Courts of Appeal
- Appellate Court decisions in 37 States
- U.S. Supreme Court reviewed and upheld constitutionality of arrestee DNA sample collections in Maryland in 2013



# Privacy Act Protections



## Privacy Act Protections

- **To address concerns that DNA data & samples could be used inappropriately, underlying principles for this law enforcement database have been to:**
  - Only Allow Limited Access to the DNA data & samples by Law, Regulation, Policies/Procedures
  - Employ Law Enforcement Identification Markers [useful for identification purposes only -- does not reveal medical or disease-related information]



# Privacy Act Protections

## No change in privacy protections since creation of CODIS program

**Q: Is any personal information relating to the convicted offenders, arrestees or detainees stored in these DNA databases?**

A: No names or other personal identifiers of the offenders, arrestees, or detainees are stored using the CODIS software (except for missing persons records that may include metadata, such as date of birth). Only the following information is stored and can be searched at the national level:

- (1) The DNA profile—the set of identification characteristics or numerical representation at each of the various loci analyzed;
- (2) The Agency Identifier of the agency submitting the DNA profile;
- (3) The Specimen Identification Number—generally a number assigned sequentially at the time of sample collection. This number does **not** correspond to the individual's social security number, criminal history identifier, or correctional facility identifier; and
- (4) The DNA laboratory personnel associated with a DNA profile analysis.

From <https://www.fbi.gov/services/laboratory/biometric-analysis/codis/codis-and-ndis-fact-sheet>





# Privacy Act Protections

## Access to DNA samples and records generally limited to law enforcement identification purposes

### **Q: What are the access requirements for the DNA samples and records?**

A: The DNA Identification Act, §14132(b)(3), specifies the access requirements for the DNA samples and records “maintained by federal, state, and local criminal justice agencies (or the Secretary of Defense in accordance with section 1565 of title 10, United States Code)” ...and “allows disclosure of stored DNA samples and DNA analyses only—

- (A) to criminal justice agencies for law enforcement identification purposes;
- (B) in judicial proceedings, if otherwise admissible pursuant to applicable statutes or rules;
- (C) for criminal defense purposes, to a defendant, who shall have access to samples and analyses performed in connection with the case in which such defendant is charged; or
- (D) if personally identifiable information is removed, for a population statistics database, for identification research and protocol development purposes, or for quality control purposes.”

From <https://www.fbi.gov/services/laboratory/biometric-analysis/codis/codis-and-ndis-fact-sheet>



# Privacy Act Protections

## Precautions for security of the data in DNA databases

**Q: What precautions are taken for safeguarding the information in these DNA databases?**

**A:** The computer terminals/servers containing the CODIS software are located in physically secure space at a criminal justice agency. Access to these computers is limited to only those individuals authorized to use CODIS and approved by the FBI. Communications between participating federal, state, and local laboratories occur over a wide area network accessible to only criminal justice agencies approved by the FBI.

Pursuant to federal law (the [DNA Identification Act of 1994](#)), DNA data is confidential. Access is restricted to criminal justice agencies for law enforcement identification purposes. Defendants are also permitted access to the samples and analyses performed in connection with their cases. If all personally identifiable information is removed, DNA profile information may be accessed by criminal justice agencies for a population statistics database, for identification research and protocol development purposes, or for quality control purposes. The unauthorized disclosure of DNA data in the National DNA database is subject to a criminal penalty not to exceed \$250,000.

From <http://www.fbi.gov/about-us/lab/biometric-analysis/codis/codis-and-ndis-fact-sheet>



# Access

## Privacy Act Notice on NDIS

- ① The National DNA Index System (NDIS) System of Records Notice (Federal Register, Vol. 61, no. 139; July 18, 1996), explains what disclosures of DNA records are authorized for laboratories participating in NDIS. **Specifically, direct disclosures of NDIS records are authorized to the Federal, State, and local criminal justice agencies who participate in NDIS.** These direct disclosures would include access to the DNA record contributed to NDIS if NDIS identifies a potential match. **A secondary or indirect disclosure of a DNA record is permitted to law enforcement agencies for criminal identification purposes. The secondary or indirect disclosure generally encompasses the release of information to a law enforcement agency following the confirmation of a match.**

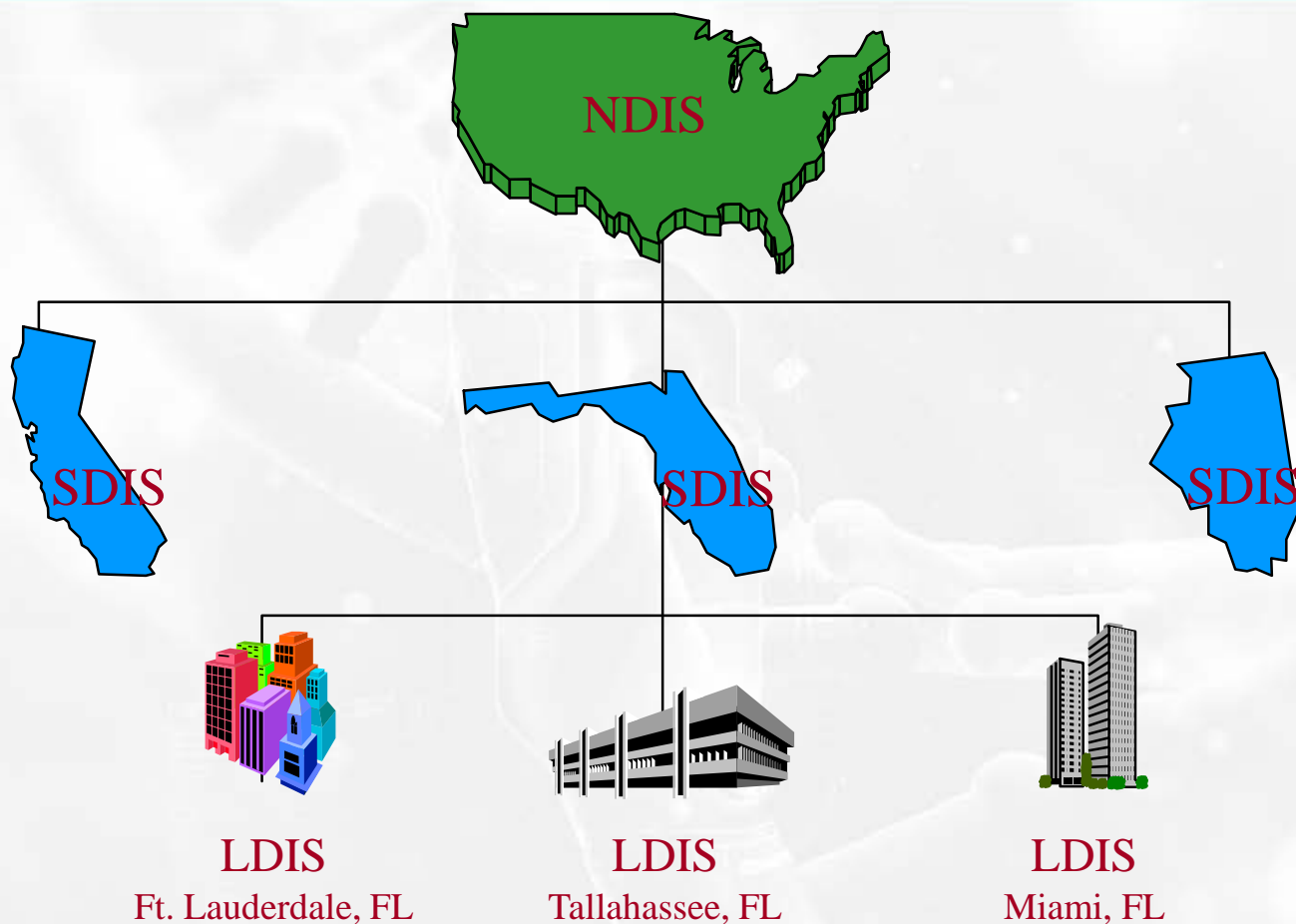


## Access

- ④ Pursuant to the Quality Assurance Standards for Forensic DNA and Databasing Laboratories, NDIS participating laboratories are required to maintain confidentiality of DNA records and documents associated with DNA analysis.
  - Standards 11.2 (database) and 11.3 (forensic)
  - Except as otherwise provided by state or federal law, the laboratory shall have and follow written procedures to ensure the **confidentiality** of the database, known or casework reference samples and the information in DNA databases and **DNA records**.
  - Except as otherwise provided by state or federal law, reports, case files, **DNA records** and databases shall be **confidential**.



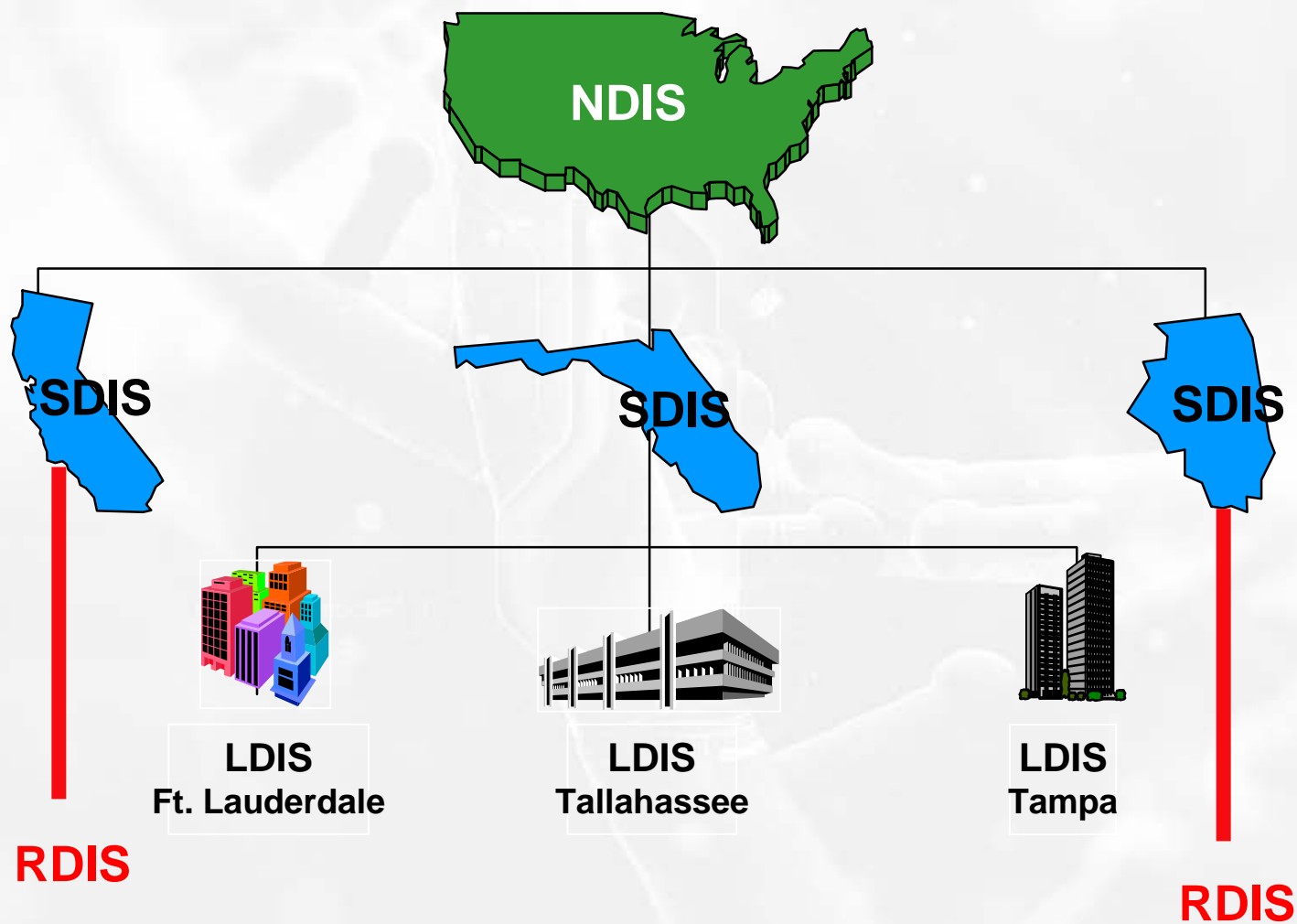
# NDIS Architecture



200 Sites = 146 LDIS and 54 SDIS



# NDIS Architecture





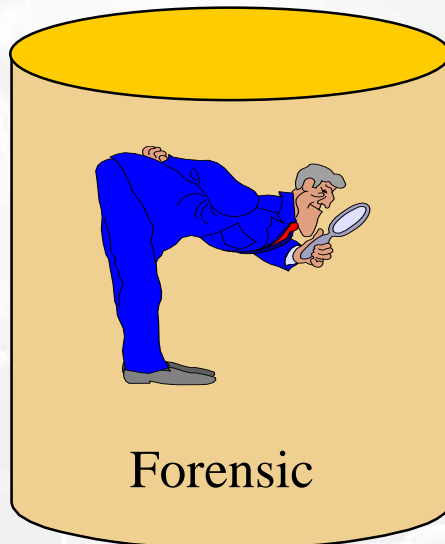
# NDIS Indexes

as authorized by the DNA Identification Act and its amendments



Offender

- Convicted Offender
- Arrestee
- Detainee
- Legal (State law)



Forensic

- Forensic Unknown
- Forensic Mixture
- Forensic Partial



Missing Persons

- Unidentified Human Remains
- Missing Person
- Relatives of Missing Person



# NDIS Statistics

*Cumulative Totals Through July 31, 2017*

| <i>Category</i>               | <i>Total Number of Profiles</i> |
|-------------------------------|---------------------------------|
| <b>Convicted Offender</b>     | <b>12,861,851</b>               |
| <b>Multi-Allelic Offender</b> | <b>192</b>                      |
| <b>Arrestees</b>              | <b>2,794,862</b>                |
| <b>Detainees</b>              | <b>25,174</b>                   |
| <b>Legal</b>                  | <b>78,449</b>                   |
| <b>Forensic</b>               | <b>610,849</b>                  |
| <b>Forensic Mixture</b>       | <b>70,278</b>                   |
| <b>Forensic Partial</b>       | <b>111,290</b>                  |
| <b>Total Offender</b>         | <b>15,760,528</b>               |
| <b>Total Forensic</b>         | <b>792,417</b>                  |
| <b>Total Profiles</b>         | <b>16,552,945</b>               |

*Through July 31, 2017*

- **370,592** Investigations Aided
- **282,452** Offender Hits
  - Crime scene to offender within a state
- **43,377** National Offender Hits
  - Crime scene in one state to an offender in another state
- **59,761** Forensic Hits
  - Crime scene to crime scene

\*Numbers represent confirmed matches where CODIS helped provide new information to a case

## **Number of Profiles added in the last year:**

587,454 Convicted Offender Profiles  
 374,301 Arrestee Profiles  
 75,753 Forensic Profiles  
 40,307 Investigations Aided

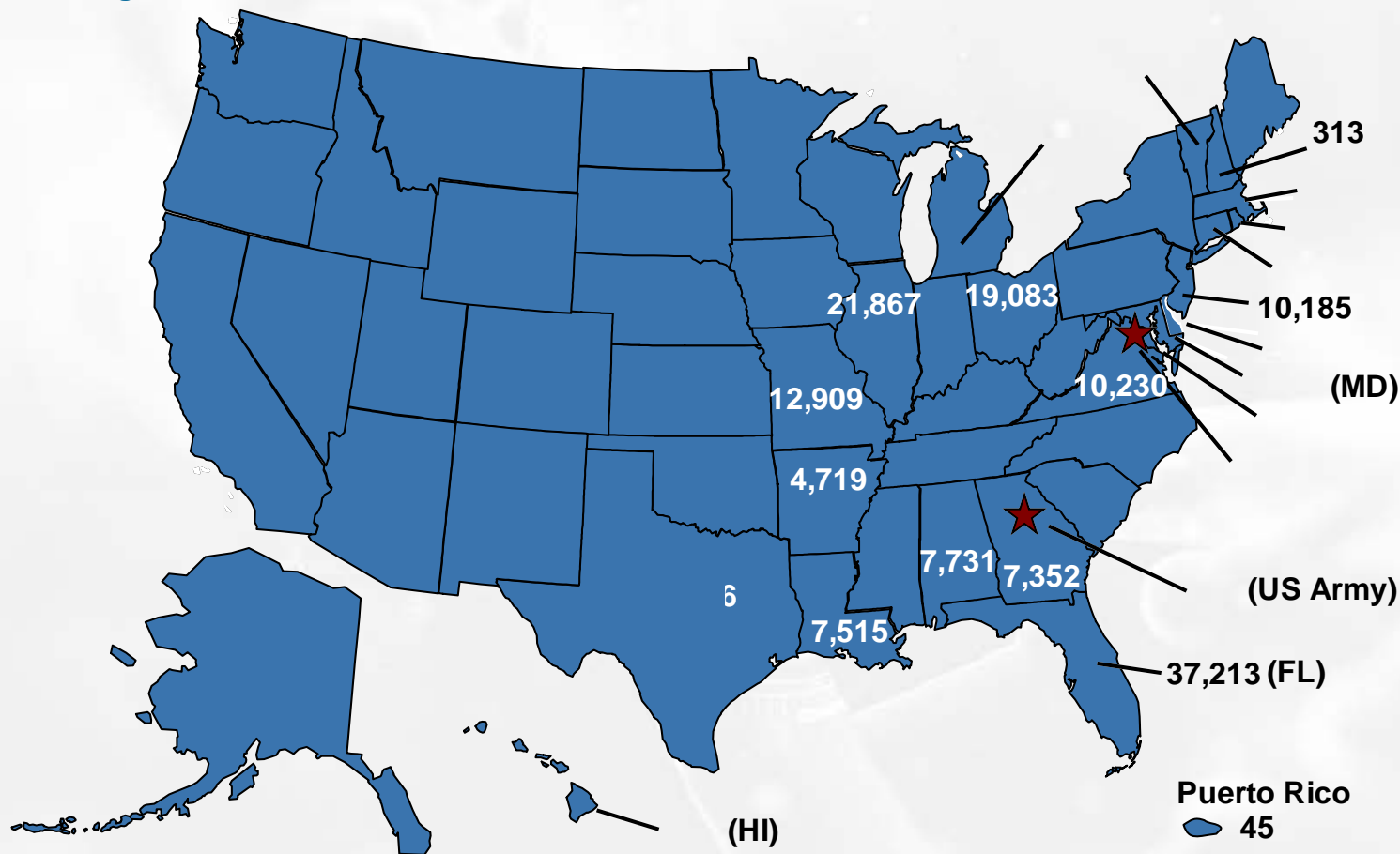




# Investigations Aided by State

Through July 2017

370,592 Investigations Aided in 51 States, 2 Federal Laboratories, and Puerto Rico



The "Investigations Aided" is a metric that tracks the number of criminal investigations where CODIS has added value to the investigative process.



# NDIS Participation Requirements

- Must be a Criminal Justice Agency
  - Federal, State or Local government
  - Also includes one Department of Defense Laboratory
- Laboratory must be capable of performing DNA testing
  - No stand alone data clearinghouses are permitted access
  - Must employ two DNA Analysts
    - Facilitates independent reviews of data
- Must be accredited by a nationally recognized, non-profit organization (ISO 17025)
- Must comply with the FBI Director's Quality Assurance Standards for Forensic Testing and/or Databasing Laboratories



# NDIS Procedures

- NDIS Procedures outline requirements for participation in NDIS and the operation of NDIS
  - QAS Audit Review
  - Requirements for NDIS Laboratories
  - Requirements for DNA records
  - NDIS Acceptance Standards
  - NDIS Searches
  - Confirmation and Hit Dispositioning



## CODIS Unit

- FBI's CODIS Unit is responsible for the administrative operation of CODIS software and the National DNA Index System (NDIS – the National DNA Database)
- Ownership and control of the data remains with the originating laboratory
- No personally identifiable information is stored at NDIS, only the DNA profile, the originating laboratory, the specimen ID number and the analyst responsible for the data
- Federal Law dictates what is allowable in NDIS
  - Current indexes include: Arrestee (federal and states with applicable laws), Convicted Offender, Legal, Detainee, Forensic, Missing Person, Relatives of Missing Person, and Unidentified Human Remains



# NDIS Shared Governance

Administration, Procedures, Science, Responsibilities



FBI and NIJ Funding

NDIS Custodian  
CODIS Unit

SWGDM  
State Administrators  
NDIS Board  
QAS Audits  
NDIS Audits

1994 Federal DNA Act  
Quality Assurance Stds  
State MOU's  
Accreditation  
CODIS Software

# National DNA Index System

## Governance Lessons Learned



- **Communication - regular meetings of stakeholders and working groups**
  - National CODIS Conference, NDIS Board, State Administrator meetings, SWGDAM, CODIS Working Group, Ad Hoc groups
- **Experienced practitioners involved at all levels**
  - State Administrators, Casework Managers, SWGDAM, CODIS WG, Technical Leaders
- **Planned Expansion (allocation of resources)**
- **State Laws**



# NDIS Operational Procedures

## Rapid DNA

Section 4.5 on *Standards for the Use of Rapid DNA Instruments/Systems in Performing Modified Rapid DNA Analysis and Rapid DNA Analysis*

**Rapid DNA Analysis** describes the fully automated (hands free) process of developing an STR profile from a **reference sample buccal swab**. The “**swab in – profile out**” process consists of automated extraction, amplification, separation, detection and allele calling without human intervention.

**Modified Rapid DNA Analysis** describes the automated (hands free) process of developing a CODIS Core STR profile from a known reference sample. This process consists of integrated extraction, amplification, separation, and detection without human intervention, but requires human interpretation and technical review.



# NDIS Procedures on Rapid DNA

- ① Rapid DNA System is a combination of
  - STR Kit
  - Instrument
  - Expert System
  
- ② NDIS approval for the first Rapid DNA System for use in an **accredited laboratory** for **known reference buccal swabs** expired on December 31, 2016 due to lack of new CODIS Core Loci.

NDIS approved Rapid DNA system.

**6. Are there any Rapid DNA systems approved for use at NDIS?**

Yes. The following Rapid DNA system was approved for use by an accredited forensic laboratory for performing Rapid DNA Analysis, that approval was effective until December 31, 2016 as the approved system does not contain the 20 CODIS Core Loci required as of January 1, 2017:

- DNAscan Rapid DNA Analysis System with the following components:

| Component                      | Part/Version Number | GE Part Number |
|--------------------------------|---------------------|----------------|
| DNAscan Instrument             | NB-INST-0002-100    | 29022852       |
| BioChipSet Cassette            | NB-BCS-0001         | NB-BCS-0001    |
| DNAscan System Software        | 1.3.55              | Not Applicable |
| DNAscan Expert System Software | 1.0.6               | Not Applicable |

No As of January 1, 2017, there is no Rapid DNA system that is approved for use by an accredited forensic laboratory for performing Rapid DNA Analysis. Additionally, no Rapid DNA system has been approved for use in a law enforcement booking station or agency. For additional information, please refer to the question below concerning when law enforcement agencies will be able to use Rapid DNA.

**7. Can a Rapid DNA instrument/system be used by an accredited forensic laboratory to develop DNA profiles from known reference samples for upload to CODIS and NDIS?**

An NDIS participating laboratory using either a Rapid DNA instrument to perform Modified Rapid DNA analysis or an NDIS approved Rapid DNA system to perform Rapid DNA analysis, in accordance with the respective requirements, may upload authorized known reference DNA records to CODIS and NDIS.

**8. Can a Rapid DNA instrument/system be used by an accredited forensic laboratory to develop DNA profiles from crime scene (forensic) samples for upload to CODIS and NDIS?**

No, the analysis of crime scene (forensic) samples by a Rapid DNA instrument/system would not be compliant with the FBI Director's Quality Assurance Standards for Forensic DNA Testing Laboratories ("Forensic QAS" Standards 9.4 and 12.2) and is not covered by the Rapid DNA Addendum. The FBI continues to monitor the development of Rapid DNA technology to address the range of crime scene samples. Forensic DNA records that are not compliant with the FBI's QAS are not permitted to be searched in or uploaded to CODIS.

### Rapid DNA Program

**9. How is the FBI involved in the development of Rapid DNA technology?**

The FBI established a Rapid DNA Program Office in 2010 to facilitate the development and integration of Rapid DNA technology for use by law enforcement. The NDIS participating laboratory has documentation of the developmental validation for the Rapid DNA instrument in accordance with Database QAS issued by the Director of the FBI in October 1993 and April 1999, respectively. Both documents have become benchmarks for assessing the quality practices and performances of DNA laboratories throughout the country. When the DAB's statutory term expired, it transferred responsibility for recommending revisions





# NDIS Procedures on Rapid DNA

## Rapid DNA System

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- ① Once a Rapid DNA System has been approved for use at NDIS, there shall be no changes or modifications to the following without approval from NDIS:
  - (1) Rapid DNA instrument
  - (2) the chemistries and/or concentrations of the PCR STR typing kit
  - (3) the settings of the Expert System.



## NDIS Procedures on Rapid DNA

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- **Forensic samples analyzed with a Rapid DNA instrument or system are not eligible for NDIS.**
- Procedure: A DNA record(s) generated from a Rapid DNA instrument performing Modified Rapid DNA Analysis or an NDIS approved Rapid DNA system performing Rapid DNA analysis on DNA samples other than known reference samples, **such as forensic samples**, shall **not** be eligible for upload to NDIS.



## Rapid DNA and Forensic Samples – Challenges

- ⦿ DNA Advisory Board (established by the DNA Identification Act of 1994) created separate Quality Assurance Standards (QAS) for Databasing and Forensic Laboratories due to inherent sample differences
- ⦿ Crime scene samples present many challenges that must be overcome
  - Many challenges require interpretation by a trained DNA analyst
    - ⦿ Mixtures – (greater than 50% of crime scene samples analyzed)
    - ⦿ Low quantity DNA
    - ⦿ Degraded DNA
  - Forensic QAS requires **quantitation** of forensic samples
  - No Expert System for crime scene samples (requires DNA Analyst interpretation)
  - Evidence retention laws and preservation of evidence policies
- ⦿ House Committee Report accompanying H.R. 510 (Rapid DNA Act of 2017)
  - “At present, Rapid DNA technology can only be used for identification purposes, not crime scene analysis.”



# CODIS Web Site

- <https://www.fbi.gov/services/laboratory/biometric-analysis/codis>
- FBI's Quality Assurance Standards
- NDIS Operational Procedures
- Rapid DNA
- CODIS and NDIS Fact Sheet
  - frequently asked questions

The screenshot shows the FBI's CODIS website. The browser address bar displays the URL <https://www.fbi.gov/services/laboratory/biometric-analysis/codis>. The page features a navigation menu with categories such as 'Criminal Justice Information Services (CJIS)', 'CIRG', 'Laboratory Services', 'Training Academy', and 'Operational Technology'. The main heading is 'Combined DNA Index System (CODIS)'. Below the heading is a large image of a DNA double helix with the word 'CODIS' overlaid. To the right is a 'Contents' sidebar with links like 'CODIS Overview', 'NDIS Operational Procedures Manual', 'CODIS and NDIS Fact Sheet', 'CODIS - NDIS Statistics', 'Rapid DNA Analysis', 'Quality Assurance', 'Planned Process and Timeline for Implementation of Additional CODIS Core Loci', 'CODIS Brochure', 'Expanded 2015 FBI STR Population Datasets', 'Amended 1999/2001 FBI STR Population Datasets', 'DNA Fingerprint Act of 2005', 'Expungement Policy', 'Familial Searching', and 'Missing Person Comparison Request'. The main text area contains an 'Overview' section describing CODIS as a tool for linking violent crimes and a 'History' section mentioning its origin in 1990.



## Contact Info



**FBI Laboratory, Quantico Virginia  
CODIS Unit**

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